The Chemical Age

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The Scientific View of Coal

IN its application to any particular process the value of fuel conservation depends upon the proportion that fuel bears to the total process cost. Some chemists have no reason to pay much attention to the fuel they use; others find that their interests lie primarily in the direction of fuel technology. The Melchett Medallist's lecture delivered at the annual meeting of the Institute of Fuel, this year by Professor Wheeler, may be said to represent the traditional chemist's view. Professor R. V. Wheeler is an enthusiast upon the subject of his life's work, the constitution of coal. He believes, as most chemists will do, that coal cannot be used properly and to the best advantage until we know all about it. He gave it as his opinion that the particular research which would be of the most value to users and vendors alike is research on the composition of coal.

It cannot be denied that this view has much to support it. Coal, however, is not treated chemically by chemical reactions—except perhaps in hydrogenation—and it is possible to use coal to very good advantage indeed without much knowledge of its constitution, so long as we are able to understand its behaviour. It is not necessary to know the constitution of coal to burn it efficiently in a boiler. The fact is that in many industries chemistry and practice may make very good progress independently of one another; but undoubtedly the quickest progress results from a blend of both. One day the chemist and the chemical engineer will find ways to turn into account the practical experience of the engineer and the knowledge of the chemist to give to the world some entirely new use for coal. The first indications of this are to be found in the synthetic production of oil.

In his Presidential Address to the same meeting, Colonel J. H. M. Greenly dealt primarily with the now familiar topic of the restriction of the quantity of coal required by industry owing to the more efficient manner in which it is used. Increased efficiency, while having striking results in the domain of fuel technology, is not specially outstanding in that direction. The chemical industry over the past 30 years can show much the same progress, in many directions. Colonel Greenly introduced a note which has been lacking of recent years, in pointing to the inevitability of the exhaustion of our coal supplies. We have been so busy trying to persuade people to burn more coal in order to keep the miners at work, that we have been in danger of forgetting the serious consequences of wasting our fuel assets. Great Britain consumes more coal per head of the population than any other country in the world; and we are deficient in water power resources. Even when we attempt to use water-power for chemical industry, means are found to prevent it.

It is an outstanding fact that at the present average rate of consumption our coal supplies will last for some 860 years. On the same basis, Colonel Greenly calculated that the coal of other countries would last for: Soviet Union, 35,470 years; Germany, 1,950 years; Canada, 25,000 years. It is not only the availability of coal that matters, but its price is equally important. It will not do for us to reflect comfortably that it will be 860 years before our coal is worked out. It will be much less than that before rising coal prices cause us to lose our competitive power in the world markets.

In the light of these facts, should we not modify Professor Wheeler's dictum regarding the value of research on coal? Coal is a great raw material for a chemical industry of the future. Is it really desirable to convert it only into products of combustion? Is it even wise to rely upon coal as the fuel of the future? While giving the fullest importance to the work that is being done on coal, we suggest that a strong scientific body under the ægis of the D.S.I.R. should be formed and kept in being to examine by research and otherwise possibilities of obtaining heat and power by means other than from coal. These means may be impossibly expensive to-day; but research is a powerful weapon in cheapening production.

Let Whitehall Stick to Its Last

WHAT the business community needs above all else is to be left in peace to get on with the job of reviving the confidence of British industry so far as it was shaken by the recent crisis. Unfortunately there are signs that that is the last thing the politicians have in their minds. In the House of Lords' debate Lord Baldwin made a most unfortunate reference to the mobilisation of industry. He did not go into details or, indeed, explain that cryptic phrase in any way. Seeing, however, that he is a highly respected ex-Prime Minister, his declaration was widely reported and as widely canvassed. Men of smaller reputation and less responsibility pounced upon it and began rearing a bureaucratic edifice for the exercise of some form of State control over every scrap of business associated with measures for the defence of the realm.

It is true that Mr. Chamberlain, the highest authority of all, repeated in the House of Commons his pledge that the Government would not propose conscription, either in the military or the industrial field, in time of peace. That pronouncement did not deter the smaller fry, who realise that there are important powers short of conscription, which Parliament, if it had the mind, could entrust to the Civil Service. There

is much talk of new ministries, of more co-ordinators and priority-merchants, and in general of the official supervision, and even domination, of business which had to be accepted between 1914 and 1918, but would completely defeat its object if transferred from war to peace conditions. The business man so far has remained patient and even silent under these new threats to the efficiency of the industrial machine. All he asks is that Whitehall should stick to its last. Nobody has ventured to charge the industrial and commercial classes with any lack of patriotism or of determination to carry out all defence measures which the Government regard as vital. Instead of being helped by the intervention of the bureaucracy, the business man seeks nothing more than to do his own job in his own way.

The late crisis has stirred up an extraordinary amount of muddled thought among politicians. In talking of new defence plans they have got it into their heads that in the last emergency the whole of the military measures taken in the last war will have to be repeated, with the addition of a vast new range of air raid precautions. Apparently well-authenticated reports of official plans for dealing with business in a possible war suggest that some Government departments are infected with the same bug. Yet it should be obvious to all but the panic-stricken scaremongers that, whereas Great Britain's contribution in the last war was predominantly on land and sea, next time it would be on sea and in the air. There has been much loose talk of the immediate closing down of large areas of business at the behest of the Government and of the instant calling out on national service of millions of men who are now engaged in productive enterprise. Such measures might conceivably have to be taken if Great Britain had to raise Kitchener armies to fight to the death on the Continent. Every indication points in the other direction. The main effort of Great Britain would be to man and expand the Fleet and the Air Arm and, defensively, to organise a perfect system of precautions against air raids.

There would, in fact, not be the unlimited demand of 1914-1918 for men for service abroad. There would, however, be an over-riding need for the preservation and maintenance at home of the sinews of war. It is too readily forgotten that these include trade and finance as well as munitions. The average man's task will be to get on with his job and, if there is an interruption from the air, to avoid being hit by a bomb. These needs are all measurable in advance, and there should be no hush-hush atmosphere enveloping the discussion of them. The business classes should urge Members of Parliament to have them thoroughly ventilated during the coming sittings of the House of Commons.

It is being glibly said that the next war would lead to what in fact would be the immediate socialisation of everything and everybody in this country. The idea may sound absurd, but there are forces at work which cannot be trusted with the liberal and democratic traditions of the British people. They might be dangerous in time of war, but fortunately there is time to clip their claws. They would undoubtedly like to butt in on the intensified rearmament programme, but they must not be given the chance. The manufacturers and workmen in the industrial areas can supply every scrap of rearmament needed for the defence of this country. They will do this national task more promptly and efficiently if Whitehall gets on with its business and leaves them to get on with theirs.

Notes and Comments

Overseas Trade in September

ALTHOUGH the crisis restricted trade during the latter part of September, the Board of Trade returns for the month showed the usual seasonal expansion compared with August in both imports and exports; but there was a big decrease compared with the figures for September, 1937. Thus, imports for the month at £75 millions were about 14½ per cent. lower than in September, 1937, and exports at £43¾ millions were 12¾ per cent. lower. However, the adverse balance of visible trade at the close of last month amounted to £31¼ millions as against £38¼ millions for the previous year. A more satisfactory feature is that the recent severe falling-off in exports would have appeared to have received its first decisive check; last month's exports reaching the highest aggregate since April last. Figures for the trade in chemicals underwent similar changes to those of trade as a whole with a fall in imports over the previous September of £64,895, in exports of £319,906 but with an increase in re-exports of £7,626. At the end of last week, there was big renewed activity in American industry with a corresponding rise in the stock markets. It is not too much to hope that this may be a prelude to a large increase in America's demand for raw materials thus enhancing the purchasing powers of the producing countries, particularly of the dominions and colonies, and leading to a great expansion in inter-Empire trade.

A New Sulphuric Acid Plant

ON page 315 there is a description of the new contact sulphuric acid plant designed and erected by Simon-Carves, Ltd., for L. F. W. Berk and Co., Ltd., now in full production at the latter company's Abbey Mills works, West Ham. We visited the works on Tuesday, when the operation of the plant was expertly described, and one or two features of the process could be singled out as those on which the success of the production depend. The first is, of course, the catalyst, platinum, the original catalyst extensively employed in earlier contact plants, suffered under the great disadvantage of being rapidly poisoned if the sulphur dioxide to be converted was not of very high purity. In the present plant, metallic vanadium is the catalystic agent and this metal is said to be so immune to the poisons as to have an almost everlasting life. Another feature of the plant is its simplicity of control; temperature pressure, and slow indicators all grouped as one panel show the conditions at all important points in the plant; only one operator is necessary for supervising the plant and routine testing. The plant itself is extraordinarily compact, being entirely contained in one building, and the provision of spare sulphur melters, fitters, etc., so that parts of the plant can be cleaned and overhauled without interfering with production, is another noteworthy feature. Altogether, the plant is an excellent example of what can be done in sulphuric acid manufacture.

Association of British Chemical Manufacturers

A Year of Sound Work—Directions for Future Activities

THE 22nd annual general meeting of the Association of British Chemical Manufacturers was held in London on October 13, under the chairmanship of Mr. E. V. Evans, O.B.E., F.I.C. In moving the adoption of the Annual Report for the year ended May 31, 1938, the Chairman said that it might not contain any items of spectacular interest, but he hoped it would be agreed that it represented a record of sound work on behalf of the chemical industry and demonstrated that the interests of members had been closely watched and safeguarded. His comments would be directed to the items which were of major importance and particularly to those which indicated directions for the association's future activities.

The increasing membership during the year is very gratifying, continued Mr. Evans, and we can now claim that only very few firms of importance remain outside the fold. It will continue to be our endeavour to secure their adherence so that we may be able to claim as near complete representation as it is possible to achieve in this imperfect world.

Mr. E. V. Evans, O.B.E., F.I.C., Chairman of the Association of British Chemical Manufacturers.

Dr. Carpenter's Passing

With the passing of yet another year, the deaths of several former colleagues had to be recorded in the report, but of one Mr. Evans made special mention as his loss affected him personally very closely. He referred to the death early in September of Dr. Charles Carpenter, who for many years was the President of the South Metropolitan Gas Co. Dr. Carpenter was the first Chairman of the Association and in its formation he played a leading part. Those who were members of the Council at that time, and the former General Manager, Mr. Woolcock, have testified how Dr. Carpenter by his wise counsel, strong personality, firm direction and sympathetic handling of delicate situations, not only steered the young Association through its early difficulties, but placed it upon such a sure foundation that its progress has been continuous since that day. It was his clear understanding of the problems that would confront our industry when the war days were over that made this possible. As a mark of appreciation of his services in these early years, the Association made him a life vice-president, on the expiry of his office as chairman, an honour which has since been conferred on only one other individual.

For the chemical industry the most noteworthy piece of legislation during the year was the Coal Mines Act, Mr. Evans went on, and the Council, through the Federation of British Industries, made insistent representations which, added to the efforts of others, ensured that due prominence was given in Parliament to the interests of the coal consumer. As a result, industry was able to secure certain important guarantees from the Mining Association which, if fully implemented, would do much to improve the position of the industrial consumer of coal.

The trade negotiations with the United States which have been in progress during the last six months have caused much concern to British industry. Such negotiations can lead to a just agreement only if both sides are prepared to make concessions. In this case it is particularly necessary that the concessions should not be one-sided in view of the already large adverse trade balance and the fact that our tariffs are but moderate compared with those of the United States. Up to the present American industry has had the great advantage of knowing the details of the requests which we have submitted and of being able to prepare and study fully its case regarding them.

Negotiations with Germany

We have had no such opportunity. In spite of strong and insistent pressure, the most that British industry could secure was an assurance that the Board of Trade, if it felt that it required any additional information, would consult privately with the industries likely to be affected. Negotiations with Germany have now commenced and it is hoped that an opportunity will be afforded to mitigate, to some degree at least, the unfair competition which arises from the use of such devices as subsidies, special marks, and clearing arrangements. Private enterprise cannot be expected to compete unaided with what is, in essence, State trading using weapons which only a State could employ.

In this connection, and in relation to trade treaties generally, we strongly support the view of the Federation of British Industries that sufficient use is not made of the purchasing power of this country to obtain trade concessions from foreign countries, especially when negotiating treaties with countries with which we have an adverse trade balance. The principle of most favoured nation treatment is undoubtedly a great handicap and capable of much abuse and we feel, with the Federation of British Industries, that the British Government should take greater powers to deal with those countries which are not prepared to reciprocate by buying in return for the goods which they send to us, a reasonable amount of the produce of British industry.

The next two items in the annual report, namely, the Factories Act, 1937, and Safety, are closely associated. It is over ten years since the Association initiated its pioneering work on safety and started its service of safety publications which are now in wide demand, not only in the chemical industry itself, but also in many other industries. The chemical industry has thus led the way in the adoption of measures for safeguarding the worker from the hazards of his employment. Therefore it is only natural that the industry should be in complete agreement with the principles underlying the new Factories Act. The measures therein proposed are already standard practice in the more progressive and up-to-date firms and go no further than the Association's own Model Safety Rules. The Act deals primarily with broad principles and it is natural that in their application difficulties should arise, especially in technical industry of such complexity as ours. In some cases strict compliance with the law would be impossible. This was envisaged by those who framed the Act, and provision has been made for exemptions in these cases. It is these exemptions with which the Association is dealing on behalf of its members.

Patent Problems for Solution

Two important patent problems call for solution. The first is the question of medical patents, and here it is hoped that by the exercise of that spirit of reasonable compromise which characterises the British nation, it will be possible to find, in consultation with the medical authorities, some way out of the difficulties.

The other problem is the one mentioned in the report in the section on publicity. A sufficient amount of evidence has

been collected to show that omnibus blocking patents constitute a serious handicap to the development of our industry. The examination of the problem by our Patents Committee may reveal that there is not only a case for an amendment of the patent legislation, but also for the constitution by the Association of some central machinery which would scrutinise closely all chemical patents as soon as they appear, and take appropriate action where such is warranted.

The urgent problem of air raid precautions has been continuously before the Association for the past three years and recent events have made clear, even if it were not clear before, the importance of this measure. The Association proposes to hold periodic meetings for the discussion of special difficulties and for the pooling of knowledge and experience

Potato Marketing Board

The recent inquiry into the new powers sought by the Potato Marketing Board has raised a question of principle having far-reaching implications and the industry will need to give this matter its most serious attention. The constitution of such Boards as these is authorised by the Agricultural Marketing Acts and these Acts contain provisions whereby the Marketing Boards might have power to manufacture commodities from the materials which they regulate. It is only common sense that some such powers should be granted when the purposed manufacture is of closely associated products.

What was not contemplated by industry was that unlimited powers of manufacture would be given to these Boards which are in the nature of State created monopolies. Furthermore, it was not foreseen that the Boards, when constituted, could ask for the widest possible facilities without the necessity for making out any case for the grant of these powers.

The recent inquiry produced a ruling from the Commissioner that the onus of proof that the powers were unnecessary or undesirable rested on any industry which wished to oppose the grant of the powers. If this is the correct legal interpretation, then the onus of proof is surely placed on the wrong shoulders. This incident emphasises the need—if such emphasis is necessary—for the closest scrutiny of all enabling legislation to ensure that wide powers of such a potentially dangerous nature are not allowed to be granted without protest.

Mr. Evans said that in making these comments he was aware that he had not referred in detail to several sections of the report, but it was manifestly impossible to deal with every activity of the Association.

In the midst of discussions about trade depressions, the Chairman continued, it is interesting to observe how the chemical industry has fared during the last eighteen months. There are some who aver that the industry, serving as it does all of the industries, is a fairly accurate index of the industrial activities of the nation.

The Board of Trade's figures for the index of production in the chemical group were 115.4 in 1936, 124.5 in 1937, 123.5 in the March quarter of 1938 and 117.4 in the June quarter of this year. It will be seen that this last figure, though showing a substantial fall, is still slightly better than that for the whole of 1936.

Chemical Industry Holding Its Own

A comparison with the corresponding figures for all manufacturing industries is of interest, the figures being 129.4 in 1936, 138.3 in 1937, 136.9 in the March quarter of 1938 and 127.3 in the June quarter of this year. Here the last index is lower than that of 1936, and these figures would appear to support the statement that the chemical industry is holding its own better than industry in general.

Turning to the export trade we find that chemical exports in 1937 were valued at just over 24½ million pounds, an advance of 3.½ million pounds on the figure for 1936. The first six months of 1938 showed that exports were down to 11 million pounds, equivalent to a drop of 2½ million pounds in the year if the same rate of decrease were maintained.

Imports in 1937 were nearly 14 million pounds, showing an increase of 1¼ million pounds on 1936. In the first six months of this year they also showed a decrease equivalent to a fall of some 2 million pounds on the year, which means that imports are now lower than they were in 1936.

Taking all these figures together, it would appear that the position of the chemical trade, although having suffered some recession, is still better than it was in 1936. Of the trend in the immediate future, it is not possible to make any definite forecast.

It is impossible to pretend that these figures are other than disappointing, but they give no cause for serious dissatisfaction when the numerous adverse influences with which we have had to contend are borne in mind. Notably amongst such influences we must remember high tariffs, quotas, licensing systems, payment difficulties and those devices which are peculiar to the foreign trade of Germany, and arise from the urgent need of that country to sell goods abroad in order to secure foreign exchange with which to purchase those essential commodities that they cannot produce at home. The very considerable assistance which the German chemical trade receives from its Government is in contrast to the conditions existing here. In this connection Mr. Evans said he would refer to a suggestion contained in the report of the recent British Chamber of Commerce Delegation to Finland. The suggestion is that international cartel arrangements prevent British firms from quoting for Finnish orders and implies that such cartels are a handicap to our export trade. It is necessary to remember that a large number of cartel arrangements were forced on British industry as its only means of self-protection in the days when there were no tariffs to protect the home market. In making such agreements the British firms concerned naturally did everything possible to secure the maximum benefits for this country and there are certain official authorities in this country who advocate these cartels as a better means of securing stability in international trade than tariffs. At the same time it is felt in many quarters that British firms are at a disadvantage when they have to negotiate such arrangements with continental competitors who receive such strong support from their Governments. If we are to rectify the growing adverse balance of trade, it will be necessary for British industry to be able to negotiate on a more equal footing. In spite of all these disabilities it can be said that the chemical industry is wide awake and misses no opportunity of securing export trade.

Tribute to I.C.I.

In conclusion, Mr. Evans conveyed to his colleagues on the Council his sincere thanks for that loyal and willing support which had been at all times given and which had made his task as chairman a comparatively easy one. He also thanked all members for the way in which they had supported the Association and to assure them that he did appreciate how much time and trouble it must have meant in many cases to supply the data which had been required. In particular he paid tribute to Imperial Chemical Industries, Ltd., who had always been willing to place at the Association's disposal their experience and the ability of members of their specialist staff. It was co-operation of this type which made the work of the Association possible. Finally, he offered his thanks to the staff. Of the great amount of valuable work that they did the Council heard something, but of necessity most of it must remain behind the scenes and it would therefore be easy to overlook the debt of thanks that was owing to them.

The following officers were elected for the ensuing year: *President*: Dr. F. H. Carr, C.B.E., F.I.C. *Vice-Presidents*: Dr. E. F. Armstrong, F.R.S., Sir Christopher Clayton, C.B.E., Ph.D., F.I.C., Mr. C. A. Hill, B.Sc., F.I.C., Sir

David Milne-Watson, Bt., D.L., LL.D., Mr. R. G. Perry, C.B.E., and Mr. E. Wallace. *Honorary Vice-Presidents*: Sir Martin O. Forster, F.R.S., Mr. Norman N. Holden, Mr. David Lloyd Howard, J.P., Lord McGowan, and Sir Robert Mond, M.A., F.R.S., J.P. *Council—Chairman*: Mr. E. V. Evans, O.B.E., F.I.C. *Vice-Chairman*: Mr. R. Duncalfe. *Honorary Treasurer*: Mr. C. F. Merriam. *Elected members*: Mr. F. W. Bain, M.C., Mr. H. Ballantyne, F.I.C., Mr. G. E. Howard, Dr. P. C. C. Isherwood, O.B.E., F.I.C., Major T. Knowles, Mr. W. F. Lutyens, Mr. L. P. O'Brien, Mr. Donald J. W. Orr, Mr. A. E. Peak, Capt. D. S. Peploe, Mr. F. M. Roberts, Mr. Kenneth H. Wilson, and Mr. W. J. U. Woolcock, C.M.G., C.B.E. *Co-opted members*: Mr. A. Vyvyan Board, D.S.O., M.C., Mr. C. E. Carey, Dr. A. E. Everest, F.I.C.

The Rt. Hon. Oliver Stanley, M.C., M.P., President of the Board of Trade, was the principal guest at the annual dinner of the Association held at Grosvenor House, Park Lane, on October 13, with Mr. E. V. Evans in the chair. Nearly 300 guests were present, including Lord May, Sir Percy Ashley, Sir Christopher Clayton, Sir Robert Robertson, Sir Robert Pickard, Sir Duncan Wilson, Sir Gilbert Morgan, Professor F. G. Donnan, Dr. E. F. Armstrong, and Dr. W. Cullen. Mr. R. Duncalfe, Vice-Chairman, proposed the toast of the guests, to which the Rt. Hon. Oliver Stanley, Professor F. G. Donnan and Sir Duncan Wilson responded. Excellent speeches by Mr. Evans, the Chairman, and Mr. J. Davidson Pratt, General Manager of the Association, concluded a thoroughly enjoyable evening.

Hydrolysis of Wood

Production of Sugar, Albumen and other Valuable Products

AT a conference of the Rheinland section of the Deutschen Gas und Wasserfach held at Kreuznach recently, General-Director Herr Einsmann spoke on the hydrolysis of wood for the production of sugar and other products. According to a report in the *Deutsche Bergwerks Zeitung* (September 18), Herr Eismann said that the problem of converting wood into practical substances for human nourishment had been the subject of much research, culminating in the commercially applied processes of Dr. Scholler and Dr. F. Bergius.

In the hydrolysis of wood, sugar is not the only valuable product. In Germany the sugar requirements are covered very well by the cultivation of sugar beet, but by fermenting the cheaply won wood sugar by means of a special kind of yeast, there is obtained a most valuable form of albumen in the form of albuminous yeast which is especially suited for cattle food, and can take the place of the much more expensive albuminous cattle foods. Moreover, it is possible to obtain from wood sugar a yeast which either directly, or in prepared form, is suited for human nourishment. The meaning of this is the possibility of obtaining a great increase in the production in Germany of albumen and carbohydrates and thereby, indirectly, the production of fat. A new regulation of the fuel market which would set free for hydrolysis the wood now used as fuel in favour of hard or brown coal, would create almost unlimited possibilities for the production of sugar and albumen.

In the conversion of wood to sugar, the lignin of the wood remains as a residue of considerable importance. As a fuel it has a heating value per kg. of 6,000 calories, compared with 4,600 calories per kg. of brown coal briquettes. It burns without producing slag or ash and in the briquetted form is an excellent household fuel. But its employment possibilities extend much further; in a finely powdered condition it ignites so readily as to be well suited for the direct drive of an explosion motor. It can also be used as adsorptive, like active carbon, and a further use is for improving the properties of soils by increasing their retentivity for moisture and the soluble salts of artificial fertilisers.

Other by-products of the conversion of wood into sugar are gums, tannic acid and pentone. The gums obtained from the conifer woods are less valuable than from the leaf-bearing woods. The latter are soluble in alcohol and are, therefore, useful for the lacquer manufacturing industry. By a previous extraction of oak wood an aqueous solution of tannic acid is obtained which can be concentrated by evaporation to an 88 per cent. solution or be further treated to produce powdered tannic acid.

By a preliminary hydrolysis of all leaf-bearing woods, the pentones obtained can be be the source of crystallised xylose, while the mother liquor will contain furfurol useful as a lacquer solvent. Xylose is the only form of sugar that sufferers from diabetes can assimilate, but it is only sparingly used in medicine because of its hitherto high cost of about £35 a kilogram, due to its synthetic preparation. The xylose obtained from wood, however, can be produced on a commercial scale for less than one RM a kilogram.

Light in the Factory

Means for Measurement

AMONG the many equipment problems to which the attention of managers and engineers has been drawn by the new Factories Act is that of illumination. Sufficient and suitable lighting has now to be provided in every part of a factory in which persons are working or passing, and gradually shortening hours of daylight call for a careful examination of the standard of illumination at present existing. Fortunately, instruments are now available in the form of illumination meters, which enable the lighting at any point to be measured very simply.

A miniature instrument of this type is now being made at the Salford instrument works of The General Electric Co., Ltd., and is particularly suitable for factory use. Though it is quite inexpensive and weighs only a few ounces this instrument enables all the necessary measurements to be made with ample accuracy, giving direct reading in foot candles from 0 to 250. It consists of a very sensitive micro-ammeter combined with a photo-electric cell of the selenium type, the whole being housed in a metal case. The scale has a logarithmic character so that the divisions for the lower foot candles are open and easy to read; it is calibrated for use with tungsten filament lamps, but a suitable correction factor can be easily employed with other forms of illumination. The photo cell is protected by a hinged lid from the harmful effects of prolonged exposure to light, and a leather carrying case is provided. The complete instrument is a cheap and compact means of making comparative illumination readings.

NEW LABORATORY REFERENCE RULER

THE Chem-O-Meter, a new laboratory reference ruler marketed by Chemical and General Distributors, Ltd., sets out the more important characteristics of the chemical elements in a compact form for ready reference. The atomic numbers of the elements are inscribed in the right hand corner of the base of the ruler, and, having obtained from this the atomic number of the element required, the symbol, valency, isotopes, atomic weight, specific gravity, melting or freezing point of the element can be read off with the aid of a slide. The reverse side of the ruler presents a number of unified conversion tables. The information given by the ruler will often avoid a troublesome reference to text-books.

Soft Resin from Lac

Its Conversion into a Useful Product

VARIOUS methods of modifying the soft resin formed during lac manufacture are reported by Venugopalan and Sen (*Paint Technology*, 1938, 3, 33, 297-304). Considerable quantities of soft resin are formed during the production of pure lac resin by the acetone-urea method of fractional separation. This resin is unmarketable because it combines slow drying with a high acid value (about 100).

The acetone solution of the resin may be concentrated by the removal of solvent, and then 2.8 parts of syrupy phosphoric acid in acetone solution added for every 100 parts of resin, and the mixture heated to 150° C. for 10-15 minutes. The cooled mass sets to a hard solid which softens between 42 and 48°, and melts at 79-80°. It is re-melted under boiling water, and washed free of phosphoric acid by repeated decantation. The dried product is soluble in all the common solvents and gives an air-drying, water-resistant varnish, which causes no greening of copper, even after prolonged baking at 150°, although its acid value is 100.

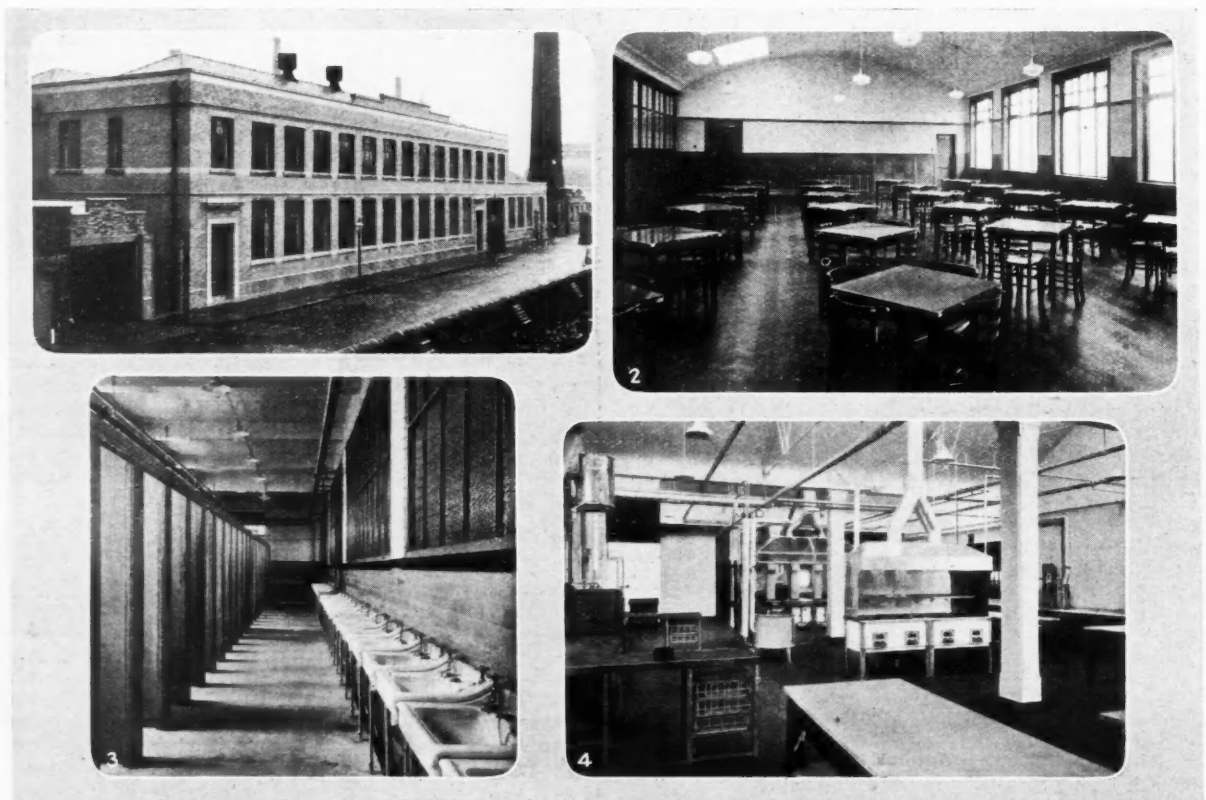
According to another procedure, the resin is dissolved in 15-20 per cent. of its weight of analine at 120°, the mixture cooled to 60°, and to it is added an amount of paraformaldehyde equal to that of the aniline. The temperature is gradually raised to 120°, and the heating continued at that temperature for about 25 minutes. The product, when cooled, is hard and brittle and is soluble in alcohol and benzene to give an air-drying varnish. Its acid value is 65-81, it softens between 66 and 75°, and melts at 78-81°. It has practically the same properties as the average shellac.

Another treatment outlined involves heating at 100° equal parts of the resin and phenol or cresol, and formaldehyde, until a thick consistency is reached, and then at 120° for 2-3 hours. The cooled mass is a hard, transparent resin, as brittle as rosin. It has an acid value of 60-70, softens at 70-72°, and melts between 83 and 84°. The films obtained from its solution in alcohol or benzene are, however, not water-resistant and lack flexibility. This resin can be incorporated into tung or linseed oils to give varnishes of desirable characteristics.

THE B.S. SPECIFICATION FOR PROTECTIVE GLASS

Mr. R. R. Butler, M.Sc., F.I.C., Chairman for the 1938-1939 session of the Liverpool and North-Western Section of the Institute of Chemistry, and Principal of the City of Liverpool Technical College gave an address entitled "A Study in Standardisation" to the members of the section at the opening meeting held at the Constitutional Club, Liverpool, on October 13. Mr. Butler had been Chairman of a Drafting Committee of the British Standards Institution, whose deliberations, extending over several years, had resulted in the issue of a British Standard Specification for Protective Glass for Welding and other High Temperature Operations, and in his address he described the work which had been done in evolving the specification and compared it with the standard specification issued in America.

He said that in the present state of our knowledge the protection provided by the requirements of the B.S. Specification can only be secured by glass having a somewhat greenish neutral colour, because as far as is known the essential constituent of such glass must be iron in the ferrous condition. One such glass of British manufacture is marketed under the trade name of "Protex," and a lighter shade is also marketed under the name "Calorex."



A new building comprising canteens, locker rooms and baths at the Clayton works of the Clayton Aniline Co., Ltd., opened on Tuesday by Dr. A. Schedler, formerly technical director of the company. 1. An exterior view of the new building. 2. One of the staff dining-halls. 3. Bath cubicles and wash basins. 4. The kitchens.

Sulphuric Acid Manufacture

New Contact Plant in Operation at Works of F. W. Berk and Co., Ltd.

THE vital importance of sulphuric acid and oleum to this country, both from the national and commercial standpoints, needs no emphasis. Without adequate supplies of these chemicals it would be impossible to produce enough explosives for our defence programme, and many other industries would be severely hampered. The installation of a new sulphuric acid plant at the Abbey Mills Chemical Works, West Ham, by F. W. Berk and Co., Ltd., is, therefore, a matter of wide interest. A visit to the works was made on Tuesday to inspect the plant.

Contact System Operation

The plant operates on the contact system using sulphur as the raw material. The vanadium catalyst developed by the Monsanto Chemical Co. of America is employed, and it is this catalyst which has revolutionised the technique of acid manufacture by the contact process. The complete plant, from foundations upwards, has been designed and erected by Simon-Carves, Ltd., the well-known engineers specialising in the manufacture of chemical plant, electrostatic detarrers, benzole recovery plant, and by-product coking equipment.

Quite a number of contact sulphuric acid plants were erected in this country during the Great War, chiefly for the production of oleum, and in these a platinum catalyst was employed. With this catalyst it was essential that the sulphur dioxide gas should be thoroughly cleaned and all "poisons" removed, otherwise the conversion efficiency of the sulphur dioxide to sulphur trioxide was seriously affected. The vanadium catalyst is immune to the action of poisons, and the Monsanto Chemical Co. first put into commercial operation their vanadium catalyst some 12 years ago, licensing it to users some two years later.

During the last decade great strides have been made in the improvement of contact sulphuric acid plants by taking the fullest advantage of the immunity of the vanadium catalyst. More and more economies are being achieved not only in the capital cost of these plants but in the cost of acid production, and these economies are largely due to simplifications in the design of the plant and the ability to build ever larger plants in single units. Units varying in size from 4 tons of 100 per cent. acid per day up to 100 tons per day are now in operation.

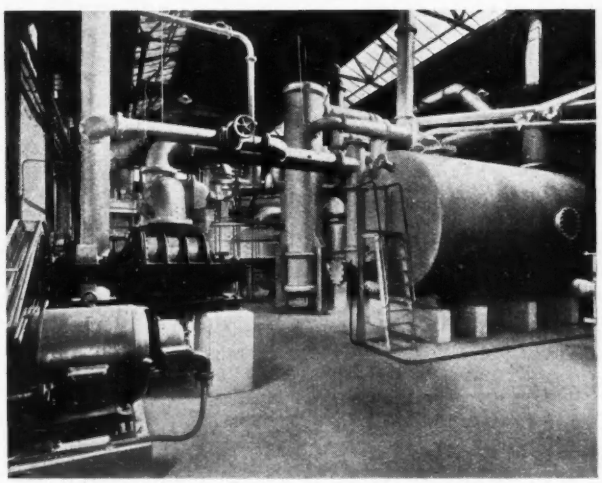
Illustrative of the modern contact unit is the new plant at the Abbey Mills Chemical Works, and as sulphur is burnt for the production of the sulphur dioxide no purification system is employed, since the impurities in the sulphur do not affect the catalyst. Acid mist is eliminated by drying the air for the combustion of sulphur and for oxidation of the sulphur dioxide before entry to the sulphur burner. In addition, sulphur is admitted to the burner in the molten state and thereby all moisture and practically the whole of the ash is removed before the introduction of the sulphur to the burner. Sublimation of the sulphur is eliminated owing to the small amount of molten sulphur present in the burner at any time.

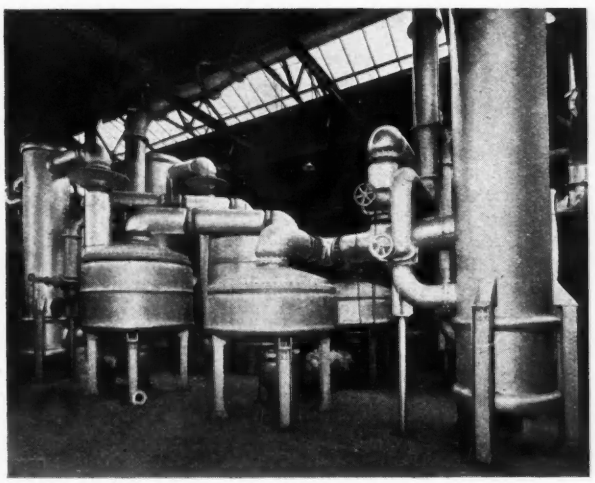
The plant has a rated capacity of 24 tons daily expressed as 100 per cent. sulphuric acid, the acid being produced in the form of 94 per cent. or 98/99 per cent. or oleum, whichever is desired. In addition, there are means, previously installed, of breaking down the acid to any strength. An extremely neat, simple and compact layout is achieved, and all the vessels, towers, etc., are housed in a steel framed brick panelled building.

Dirt-Arresting Baffles

The sulphur is elevated to a steel storage hopper for feeding continuously to the sulphur melter, all the sulphur requirements for the 24 hours being fed to the hopper during the day shift. The melter is fitted with steam coils which melt the incoming sulphur, and any dirt or foreign matter present is arrested by a system of baffles. The molten sulphur, at a temperature of 130° C.-140° C. is pumped to the burner, the pump employed being of the piston type with variable stroke to give flexibility in output and is driven by a small electric motor through a speed reduction gear. A spare melter and pump is installed to facilitate the removal of foreign substances that settle out. The air for combustion of the sulphur is dried by 94 per cent. sulphuric acid in a steel drying tower lined with acid resisting bricks and filled with acid resisting rings, a feature of this plant being the use of iron free bricks and rings in order to produce an acid of as pure a quality as possible.

A spray catcher is incorporated in the top of the drying tower to arrest any acid spray from being carried along with the dried air, and which would affect the running of the blower. The air is drawn through the drying tower by a Roots-Connersville type blower driven by electric motor





Two general views of the new contact sulphuric acid plant at the Abbey Mills Chemical works of F. W. Berk and Co., Ltd. The blowers and sulphur burner are seen in the foreground of the view on the left, and the right-hand view shows (from right to left) the gas filters, converters and coolers.

through a short V-rope drive. A spare blower and motor are installed complete with isolating valves, and the air is delivered under pressure to the sulphur burner.

The sulphur burner consists of a horizontal cylindrical steel tank lined with insulating brick and firebrick, the front end having a compartment of chequer work on to which the molten sulphur is delivered through steam jacketed lines from the sulphur pump. The dried air meets the sulphur in the chequer work and the products of combustion pass to the next part of the burner where complete combustion of the sulphur takes place. A gas at a temperature of about 700° C., and containing about 7 per cent. sulphur dioxide, leaves the burner. A steady sulphur dioxide content is ensured by the type of sulphur pump employed and the air blower Variation in the sulphur dioxide content can, however, be made by controlling a by-pass valve fitted between the air suction and delivery piping.

Temperatures Reduced by Air Coolers

The temperature of the gas has now to be reduced to about 400-420° C. before entering the converters containing the vanadian catalyst. This is effected by passing the gases through two coolers in series, air being used as the cooling medium. The cooling air is delivered to these coolers at a slight pressure by a fan direct driven by electric motor, and the flow of air to each is carefully controlled to give the gas the required temperature.

On leaving the sulphur dioxide coolers the gas passes through a circular vessel containing a special filtering material to arrest any dust that may be carried forward. Two of these filters are erected in position side by side, but only one is in use, the other being brought into the gas stream only when the resistance in the filter becomes excessive due to the accumulation of dust. The filtering material can then be removed, screened, and replaced. Conversion of sulphur dioxide to sulphur trioxide is carried out in two stages, each stage being followed by a gas cooler. The oxidation of sulphur dioxide to sulphur trioxide is an exothermic reaction, and the gas, after leaving the first converter, is again cooled down in a steel cooler to 400° C.-420° C. before passing into the second converter.

Eighty per cent. of the conversion takes place in the first stage with the use of only 25-30 per cent. of the catalyst, the balance taking place in the second stage where 70-75 per cent. of the total catalyst is installed. This two-stage conversion permits simple regulation of gas temperatures in order to obtain a maximum conversion efficiency; it also gives great flexibility in operating at various outputs.

Complete Absorption

After cooling with air by passage through the coolers, the sulphur trioxide is absorbed in 98/99 per cent sulphuric acid in two steel towers similar in construction to the drying tower, the first tower being arranged for the production of oleum. Absorption is so complete in these towers that normally no signs of sulphur trioxide can be seen issuing from the exit stack. A spray catch is installed at the top of the second absorber to ensure that no objectionable entrained acid is discharged to the atmosphere. The acid circulated over both the drying and absorber towers is cooled to the required temperature by water spray coolers. The absorbing acid leaving the second absorber is diluted with water to maintain the strength of the acid in circulation between 98 per cent. and 99 per cent.—the optimum strength for the absorption of sulphur trioxide. The acid systems are provided with acid resisting brick lined circulating tanks from which the acid pumps draw their supply. The make of acid is pumped away to storage, a connection being taken from the delivery mains to the towers. Spare pumps are installed for each circulation system, the pumps being of the verticle spindle centrifugal type direct driven by an overhead electric motor.

The control of the plant is centralised in a tiled laboratory under the drying tower in which the instruments are mounted on one panel. These instruments comprise flow indicators for the dilution water, conductivity recorder for the absorbing acid circulation, pressure gauges indicating the pressure at various positions in the gas stream, blower pressure recorder, 6-point potentiometer type temperature recorder giving the temperatures at the outlet of the burner and inlets and outlets of the converters, 15-point potentiometer type temperature indicator to show the temperature of the gas at other points on the plant, the air leaving the coolers, and the acid temperatures.

The laboratory is fitted with a bench for carrying out acid and gas tests, the strength of 98/99 per cent. acid and oleum being checked by the "heat rise test." The Reich test is employed for obtaining the percentage of sulphur dioxide in the gas before and after conversion. Gas sampling lines are brought to the bench for the gas tests and in addition the blower by-pass and dilution water feed are controlled in the laboratory.

The cooling water for the acid coolers is drawn from the base of a cooling tower by a centrifugal water pump, motor driven, and is returned to the top of the cooling tower from the concrete sump under the acid cooler by a submerged vertical centrifugal pump, motor driven, and provided with a float switch for automatically stopping and restarting the pump.

Only one shift operator is required to supervise the plant and perform all routine tests, the only additional help is that required for wheeling the sulphur. Maintenance costs are very low and the power consumption on the plant is approximately 35 kWh per ton of 100 per cent. acid produced. Conversion efficiency averages 97 per cent., the product acid is clear, water white and of suitable quality for use as electrolyte. There can be no doubt that the new plant at West Ham, which is now in full operation, provides F. W. Berk and Co., Ltd., who are, of course, already large suppliers of sulphuric acid, with a greatly increased production of the highest quality acids and oleum.

First International Fertiliser Congress

Success of Rome Meeting

The First International Fertiliser Congress, which was held under the auspices of the International Federation of Technical Agriculturists in Rome from October 3 to 6, met with great success.

Official delegations representing 48 countries attended the Congress, at the opening meeting of which the speakers included Mr. A. N. Gray, hon. secretary-treasurer of the International Superphosphate Manufacturers' Association, London. The Raw Materials and Production of Fertilisers section discussed reports from Prof. Dr. Neubauer (Dresden) on the problems of nitrogen; from Mr. A. N. Gray on the problems of phosphatic fertilisers; and from Prof. Gabriel Bertrand, member of the Académie des Sciences, Paris, on the problems of the compound fertilisers.

During the second section reports were submitted by Mr. Klecka (Czechoslovakia): Nitrogenous fertilisation; Professor Tommasi (Italy): Phosphatic fertilisation; Professor Dr. Oscar Eckstein (Switzerland): Potassic fertilisation; Dr. Kunsman (United States): Fertilisation with compound fertilisers; Professor Smits (Netherlands): Fertilisation of reclaimed soils; Professor R. H. Dhar (India): Fertilisation of dry soils; Professor Marinucci (Italy): Fertilisation of shrubby plants; Professor Ugo Pratolongo (Italy): Fertilisation of herbaceous plants. Discussions also took place on the reports submitted during the meetings of the Economic and Propaganda Sections.

The four Sections passed a number of resolutions dealing with the most important subjects in their respective spheres, while the closing assembly approved several propositions, including one concerning the unification of chemical methods for the determination of the amount of nourishing elements available in soils (N, P, K, Ca).

The Industrial and Social Aspects of Fuel

Presidential Address to the Institute of Fuel

IT may be said that fuel has transformed the life of man in two ways, said Lieut.-Colonel J. H. M. Greenly, C.B.E., President of the Institute of Fuel, in his Presidential address at the annual meeting of the Institute on October 13. First, it enables him more quickly and more effectively to perform work similar to that which he can by more laborious methods accomplish with his own hands. A rough calculation shows that a strong man could in one year do work which, converted into terms of heat, would not exceed 10 therms. The coal used in our industries in one year has a heat value of 35,000 million therms, or more than 3,000 for each man, woman and child employed. The second service which fuel provides is to enable man to perform operations which would otherwise be impossible for him. In every industry, thermal and electrical energy bring about changes in the properties of matter which have provided modern civilisation with an infinity of material resources unknown to our ancestors.

The immense powers placed in our hands by carbonaceous fuels should be, and are to a great extent, factors for peace and the well-being of mankind; but many of them are equally potent for war, and Colonel Greenly said that he would endorse the words of Lord Rayleigh, the President of the British Association, at the recent meeting held in Cambridge, that scientists and engineers who have made these powers available are not to be held responsible for their misuse.

Lieut.-Colonel J. H. M. Greenly, C.B.E., President of the Institute of Fuel.

Indeed, if the governments of the world would call more freely into consultation the scientist and the engineer, he believed that much could be done to prevent the misuse of scientific discoveries. Although in many countries of the world much energy is derived from hydro-electric sources, we, here in these islands, continue to depend almost entirely upon carbonaceous fuels for heat and power. It is well to remember that in Great Britain we consume more coal per head of the population than any other country in the world, the figures for 1937 being 39 tons per head, as against less than 1 cwt. for China, which lies at the other end of the scale. Although we are fortunate in the possession of some of the carbonaceous fuels, coal, peat and their derivatives, other fuels, notably petroleum, are conspicuously lacking, and perhaps never will be produced in important quantities in the United Kingdom. On the other hand, we are also in this country relatively deficient in water power which can be made to serve hydro-electric stations.

National Duty to Examine Resources

If we take the world as a whole, we find that the solid fuels considerably outweigh in importance the liquid and gaseous fuels. In 1936, more than 1,750 million tons of solid fuel were produced, whereas the output of petroleum amounted to 247 million tons, and of natural gas, 33 billion cubic metres.

Since every phase of our national and private lives, including their safety, turn on the availability of power and heat, it is surely a national duty from time to time to examine the resources available in this country, and see whether their rate of depletion is not so rapid as to constitute a danger to our future prosperity. The most recent estimate of the coal resources of this country gives a figure of 200 billion tons (Dr. E. Wagemann, "Energiequellen der Welt," Institute for Business Cycle Research, Berlin, 1937, p. 49) available at depths and in thicknesses permitting economic working.

This vast store of coal would last, at the average rate of consumption for the past 10 years, for another 860 years, and it is interesting to compare that figure with the resources in one or two of the other principal countries of the world. The proved and probable reserves in the Soviet Union, with production constant at the 1925-35 average, would give a probable life of 35,470 years. In Germany, taking the same basis, there would be a life of 1,950 years, and it is satisfactory to know that Canada's supply would last at the present rate of production for 25,000 odd years.

Efficiency of Utilisation

As Jevons pointed out, all estimates of the life of our resources based on the current rate of consumption are misleading, as it is necessary to take into account any tendencies to expansion or contraction in the annual demand for coal. Bound up with the progressive exhaustion of our coal resources, is the ever-increasing difficulty and cost of mining. A great part of our untapped resources consists of seams which are either thin or of poor quality or at great depths. Against this, however, must be borne in mind the immense progress in mining technique as regards both reduction of wastage and increasing mechanisation in the principal coal-producing countries. We must recognise that the progressive depletion of our best seams is bound to have an effect which increasing efficiency in mining methods can alleviate and postpone, but cannot entirely prevent.

We have three fundamental processes: a gradual exhaustion of our coal resources at the rate of 230 million tons a year; a gradual increase of the demand for heat and power as new inventions and new phases of social requirements raise the standard of living; and, finally, the increased efficiency of utilisation due to the progress of fuel technology. During the past 25 years, the efficiency of utilisation has progressed rapidly, and it is probable that, for a considerable number of years to come this will continue; but sooner or later the slowing down of efficiencies must inevitably take place as they tend to approach the theoretical. So far, continued Colonel Greenly, we have been considering primarily the question of British resources in regard to coal; but it must be remembered that liquid fuels are also indispensable to modern industry. For all practical purposes, it may be said that it is impossible to estimate the oil resources of the world. The growth in consumption of petroleum has been and continues to be so rapid as to create a situation quite different from that of solid fuels. The present known resources of petroleum amount to 4,066 million tons, which gives a life of the world's oil fuels of no more than 18 years. However, this figure has little bearing on our problem, because of the rapid discovery of new fields, which, at any rate for the present, is keeping pace with the growth of production. Nevertheless, oil can only occur in certain geological strata and recent experience in this country has shown that even the existence of such strata is no guarantee that oil will be found. It may, therefore, be taken as more than probable that the world's oil reserves cannot indefinitely withstand the ever-increasing demands for natural liquid fuels, and that a shortage will make itself felt within measurable time.

There are four principal ways at present being exploited on a commercial scale of producing liquid fuel from coal. Firstly, as a by-product for the manufacture of coke and gas, the liquid fuels having a relatively small economic importance to the process as a whole. Secondly, various forms of low temperature carbonisation in which the liquid fuels play a relatively important part in the economics of the process. Thirdly, there is hydrogenation, of which fuels are the sole product, with the exception of small quantities of residual gases; and lastly, the Fischer-Tropsch process, in which again liquid fuel product is all-important.

Colonel Greenly said that he would not attempt to discuss the economics of these four processes beyond sounding a note of warning as to their possible significance. At present, liquid fuels from all four sources do not represent 1 per cent. by weight of the coal mined in Great Britain. (16th Annual Report of the Secretary for Mines, 1937).

The consideration of the relative reserves of oil and coal in the world must focus attention on the transport problem, and here there is apparent the need for systematic long range research into the various possibilities of economising the use of liquid fuel or substituting oil by coal to meet the possible shortage of the former commodity. Research is no less important in fields where direct competition between oil and coal does not exist. Here it is opportune to remember the great contrast which exists between the expenditure on research in the different branches of the fuel industries. It is estimated that two and a half to three million pounds sterling are spent in the U.S.A. alone on research and development in the refining of petroleum. This does not take into account the expenditure on geophysical research and research aiming at the improvement of production methods. Fieldner (Presidential Address to the American Society for Testing Materials, U.S. Bureau of Mines, 1937) has urged that "even more should be expended on the preparation and direct utilisation of coal." In point of fact, however, in no country, except possibly the U.S.S.R., does expenditure on coal utilisation research come within one-tenth of the figure quoted for oil utilisation research.

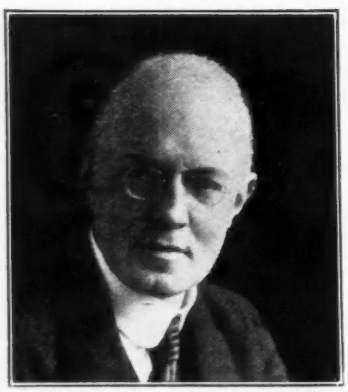
The two trends already mentioned towards greater demand for heat and power, and greater efficiency in utilisation of both, are vital to the continued prosperity of the country, and it would seem essential that there should be co-operation in accelerating both. In the national interests it would appear desirable that systematic and organised co-operation between producers, distributors and consumers of fuel of all kinds, assisted by the scientist and the engineer, should be continually pressed forward in order to discover how our resources of coal and all its derivatives can be made the best use of so as to meet economically the ever-rising standards of living.

From all that has been said it is immediately apparent that the Institute of Fuel can play a great part. When the Institute was formed some 12 years ago it was decided to impose no technical qualifications for admission to membership, though, at a later date, the grade of Fellow was introduced; but it may well be that at some future date it would be desirable to consider whether the Institute should not set on foot an inquiry into the most appropriate means of raising the status of the fuel technologist, and in this connection it is satisfactory to note that at more than one university courses in the practical aspect of fuel technology have been introduced, and in one case an engineering degree in this subject is being instituted this autumn. By a happy coincidence, it is under Professor Wheeler, of Sheffield University, the Institute's Melchett Medallist for this year, that the new Fuel Degree Course will be inaugurated.

Destructive Distillation

Its Application with a Study of the Composition of Coal — Professor R. V. Wheeler's Melchett Lecture

THE Melchett Lecture delivered by the Melchett Medallist, Professor R. V. Wheeler, D.Sc., F.G.S., F.I.C., to the annual meeting of the Institute of Fuel on October 13, described work carried out under Professor Wheeler's direction on the destructive distillation of coal as a part of the composition of coal. Professor Wheeler first gave an account of researches on the nature and ease of evolution of the volatile constituents from different coals, and investigations of the ulmins and structured plant entities present. Dealing with the oil-yielding constituents, he said bituminous coal being a conglomerate of different types of compounds which decompose at different temperatures, yielding characteristic liquid and gaseous products, the slow destructive distillation of a chosen coal as a whole should reveal the contributions of each type of compound to the distillates. The apparatus and method of distillation in a vacuum had been "standardised," largely through the work of R. Holroyd, (*J.C.S.* 1928, 3,197) and proved adequate to contain the information required. A brief description of the apparatus and method is necessary to make the procedure clear.



Professor R.V.Wheeler, D.Sc.,F.G.S., F.I.C, the Melchett Medallist.

A charge of 250 g. of the undried coal, ground to pass a 20, and remain on a 50-mesh sieve, filled a cylindrical retort of Jena glass, fixed vertically with its mouth downwards. The retort, which was heated electrically in a tube-furnace specially designed to secure a uniform temperature throughout its length, was connected by a ground glass joint, through a series of three condensers, to an automatic Sprengel mercury pump. A difficulty with regard to the collection of the less fluid oils distilled from the coal, which it was desired to separate at intermediate stages of the heating, arose through their condensation at the neck of the retort, whence they could be removed only after dismantling the apparatus. To obviate this difficulty, a glass tube bearing a small cylinder of soft iron at its lower end, was placed within a test-tube, and the two were inserted within the first of the three condensers connected to the retort. When the apparatus was assembled for an experiment and the whole had been thoroughly evacuated, the glass tube was raised by means of a solenoid, so that its upper end fitted closely over the mouth of the retort. It was then gripped in position by slightly turning a wide-bore tap. At any stage in the distillation of the coal, the glass tube could be withdrawn below the tap (which could then be closed), and the oils that had condensed within it could be removed and examined. The general arrangement of the apparatus is shown in the illustration.

After evacuation of the apparatus, the temperature of the charge of coal was slowly raised to 100° C. and maintained continuously during 120 hours. Any liquid and gaseous

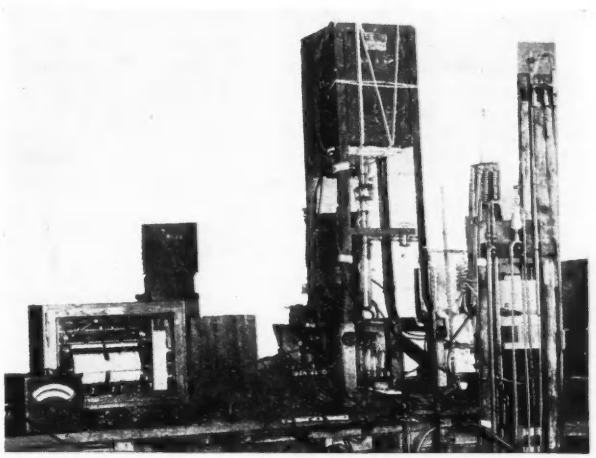
products evolved were collected, the former in the condensers, the second and third of which were cooled by immersion in solid carbon dioxide dissolved in ethyl ether, and the latter over mercury at the Sprengel pump. The temperature was now raised over the second desired range, 48 hours being taken in doing so, and maintained at the higher value during 120 hours, the liquids and gases evolved being collected as before. And so for each temperature range. The pressure within the apparatus, even at periods of maximum gas-evolution, never exceeded three mm. and was usually less than one mm.

A typical distillation is that of the Wigan Six Foot clarain (C, 81.8; H, 5.5 per cent.). Rational analysis showed it to contain 4 per cent. of organised plant entities and 3 per cent. of hydrocarbons and resins; while solvent analysis, according to a scheme worked out with C. Cockram (*J.C.S.*, 1927, 700) showed: Insoluble in pyridine (α), 81.54; soluble in pyridine but insoluble in chloroform (β), 12.34; soluble in both pyridine and chloroform (γ), 6.12. The γ-fraction contained: Soluble in light petroleum, 1.53; soluble in ethyl ether, 1.46; residue, 3.14 (all expressed as percentages on the ash-free dry coal). The portion of the γ-fraction soluble in light petroleum was found to be mainly hydrocarbons, the portion soluble in ethyl ether mainly resins.

Evolution of Gases

The gases evolved up to 100° C. were mainly the higher paraffins. No marked increase in the rate of evolution of gases occurred up to 300° C., but the proportion of paraffins decreased and that of oxides of carbon increased. Hydrogen was first noticed in the gases evolved over the range 300° C. to 320° C., but even at 350° C. the gases contained no more than 1 per cent. of hydrogen, the fraction collected over the range 320° C. to 350° C. consisting mainly of the paraffins with about 10 per cent. of higher olefins.

The coal, which had previously been exhausted at room temperature during four days, lost 5 per cent. by weight of moisture up to 100° C. Very little water was evolved between 100° C. and 300° C. The "light oils" were noticed first at 150° C.; and the "heavy oils," condensing at atmospheric temperature, at 225° C. The first runnings of heavy oils were mobile and of a red colour. They continued to be of this character up to 300° C., very little gas being evolved meanwhile. At 318° C. there was a sudden acceleration in the production of gases, water and oils. At this temperature phenolic and acidic compounds were noticed in the oils for the first time, but the bulk consisted of unsaturated hydrocarbons. At 330° C. oils of another type were distilled simultaneously with the hydrocarbons. These were viscous and insoluble in light petroleum but soluble for the most part in ethyl ether. The production of heavy oils ceased at about 390° C., the greater proportion being distilled over the range 300° C. to 375° C. Light oils continued to be evolved in small quantities above 400° C., and water up to 550° C., the highest temperature employed.



General arrangement of the apparatus used in the vacuum distillation of coal.

From a study of the quantities and analyses of the different fractions of the heavy oils and of the various extracts obtained from the original coal by solvents, details of which need not be given here, it was evident that the hydrocarbons and resins, extractable from the coal by solvents, yielded a high proportion of the oils obtained from the Wigan Six Foot clarain on distillation, the former being distilled unchanged, quantitatively, and the latter partly distilled and partly decomposed.

It was also notable that the coal had a well-defined decomposition point, at 318° C., which signalised the decomposition of the ulmins with the evolution of much water and phenolic compounds.

The Wigan Six Foot clarain contained 4 per cent. of cuticles (according to its rational analysis), and these presumably contributed their share to the oils distilled. The quantity of cuticles present was too small, however, to show clearly the temperature-range over which the oils were distilled from them. There was reason to think that the distillations of cuticles and of spore exines separated from bituminous coal had not done them justice as oil-yielding constituents, because their method of separation, careful as it was, had not left them unchanged chemically. This matter could be settled by parallel distillations of the vitrain and durain from the same seam of coal. (*J.C.S.*, 1929, 635).

The general conclusions to be drawn from the work on the destructive distillation of coal outlined in the lecture were summarised by Professor Wheeler as follows:—

With most bituminous coals containing more than about 80 per cent. of carbon there is no extensive decomposition of any constituent below 300° C. Between 220° C. and 300° C., the major part of the free hydrocarbons in the coal distils

THE RESOLUTION OF BITUMINOUS COALS BY HEAT.

Constituent.	Principal gaseous products.	Principal Liquid Products.		
		Character.	Quantity.	Temperature-Range °C.
Free hydrocarbons.	Paraffins in small quantity.	Saturated and unsaturated hydrocarbons in nearly equal amounts.	Equal to the original amount of free hydrocarbons in the coal.	225°-300°
Resins.	Paraffins and higher olefins.	Resins and unsaturated hydrocarbons.	Usually rather less than the original amount of resins in the coal.	325°-375°
Structured plant entities (*e.g.*, spore exines).	Oxides of carbon and some paraffins.	Unsaturated hydrocarbons, neutral oxygenated compounds and water.	About 30 per cent. by weight of the original plant entities in the coal.	300°-320
Ulmin compounds.	Paraffins and some oxides of carbon.	Phenolic and acidic oils, unsaturated hydrocarbons, aromatic and hydroaromatic compounds, and water.	Decreases with increase in "rank" of the ulmins; 0-1% water and 3-0.05% phenols and acids with coals ranging from 77 to 90% carbon.	Decomposition point increases with "rank" of the ulmins; from 290°-365° with coals ranging from 77-90% carbon. All oils distilled below 400°.

unchanged. At 300° C., or just above, any plant entities the coal may contain begin slowly to decompose. With clarains, this decomposition may be difficult to detect, but it is easily recognisable with durains: the gaseous products of decomposition of the plant entities are rich in oxides of carbon, and the liquids consist of water with much heavy oil containing mainly unsaturated hydrocarbons and neutral oxygenated compounds. The temperature-range over which this decomposition occurs, namely, 310° C. to 350° C. (or 300° C. to 320° C. if the duration of heating is considerably prolonged), is nearly the same with all bituminous coals.

At a well-defined temperature above 300° C. (usually) marked decomposition of the ulmin compounds begins, the products being gaseous paraffins, water, phenolic oils and liquid aromatic and hydroaromatic compounds. This " active decomposition point " increases with the rank of the ulmin compounds, and marks the breakdown of their nuclear structures. Over the range of bituminous coals studied (of carbon-content 77 to 90 per cent.) it increased from 290° C. to 365° C. The production of oils from the ulmin compounds is confined mainly to a temperature range 25° C. to 30° C. above the active decomposition point.

Above the active decomposition point of the coal, ulmin compounds, organised plant entities and resins decompose and distil simultaneously, yielding a complicated mixture of liquid products. It is difficult to trace the exact contribution made by each ingredient of the coal to this distillate, but the simultaneous liquation and decomposition (yielding hydrocarbon oils) of resins can be detected at about 325° C., continuing to about 375° C. This temperature-range, which is the same for all the bituminous coals examined, may be lowered slightly and narrowed if the duration of heating is much prolonged. The amount of resins distilled unchanged is usually less than that extractable from the coal by solvents, but it may approach that quantity if the coal also contains a fairly high proportion of plant entities yielding much hydrocarbon oils on decomposition, the presumption being that some of the resins are then " vapour-distilled."

The amounts and descriptions of the primary gaseous and liquid products of resolution of bituminous coals by heat can be tabulated as shown.

Combustion of Coal

Effect of Inorganic Compounds on the Combustion Rate

THE effect of inorganic compounds on the slow combustion of coal, has been studied by Newall (*Fuel in Science and Practice*, 1938, 260-265). The dull coal from a South Yorkshire seam was ground to pass a 200 mesh sieve, and then shaken in 10 gram lots with 100 ccs. of 5 per cent. solutions of the various compounds which it was desired to study. After settling, the coal was filtered off, and dried in vacuum over concentrated sulphuric acid. The amount of salt adsorbed was determined by extraction with hot water.

The effect of the salts on the rate of combustion of the coal was determined by observation of the rate of propagation of the zone of combustion in a " train " of coal powder, in which combustion was started by a small gas flame at one end. The rate was evaluated in terms of the time taken for the zone to travel 10 ccms.

Many compounds notably increased the rate of combustion of the coal, particularly the chlorides of iron, cobalt, manganese, calcium, magnesium, vanadium, and magnesium iodide and potassium bromide. The oxides of most of these metals were found to accelerate also, and the action of the chlorides appears to be in part at least due to their easy decomposition to yield the metal oxide; stable chlorides such as those of sodium and potassium had very little effect. Ammonium compounds, and the sulphate and phosphate radicals, were found to decrease the rate of combustion; boric acid, and its anhydride and salts, and aluminium oxide, also belonged to this class. The most efficient inhibitors found were boric acid, aluminium sulphate, ammonium alum, ammonium and sodium di-hydrogen phosphates, ammonium oxalate and titanium di-chloride. The amount necessary, in certain cases, to prevent initiation of combustion expressed as percentages of the coal were: boric acid, 6 per cent.; aluminium sulphate, 6.7 per cent.; ammonium alum, 7.0 per cent.; ammonium di-hydrogen phosphate, 8 per cent; sodium di-hydrogen phosphate, 10.5 per cent.

The effect of " inhibitors " in decreasing the rate of combustion, is much less, weight for weight, than that of " promoters " in increasing it. The effect of the latter is undoubtedly catalytic. The effect of the former is in most cases to be ascribed to prevention of the oxygen from diffusing to the coal, which the ammonium compounds in particular achieve by evolution of gaseous decomposition products.

" Lanital " Manufacture

Use of Soya Bean Casein in Japan and Manchukuo

IT is reported in the German Press that an agreement has been concluded between the Snia Viscosa and a Japanese industrial group under which the latter acquires the right to manufacture " Lanital " in Japan and Manchukuo. The German " *Textile Zeit.*" states that negotiations between the two parties have been in progress for a long time; the principal difficulty in concluding the agreement was that neither in Japan nor Manchukuo, nor elsewhere in the Far East, is milk sufficiently abundant for its extensive use in textile manufacture. The Lanital patent was, therefore, of little value to the Japanese industry unless albuminous material other than milk casein could be used in the manufacture.

It has now been proved that casein from the soya bean is a good substitute for milk casein in Lanital manufacture. Ferretti, the discoverer of Lanital, and the part owner of the patent rights, has been experimenting with soya bean casein with very successful results. At the same time, the Japanese industry has been experimenting in the manufacture of casein for textiles, but the Ferretti process is so far superior to the Japanese process that the Japanese group referred to above, has decided to use it. The agreement is extended to Manchukuo chiefly, because Manchukuo is a great centre for soya bean cultivation, and it is intended to build factories for Lanital production to be erected both in Japan and Manchukuo, which are expected to be in operation before the end of this year.

The Lanital industry in Italy, is also widening the Lanital patent basis to include soya casein. It is obvious that the milk casein available in Italy is quite insufficient as the basis of a large Lanital production which would make Italy more or less independent of imported wool.

Polarity of Oil

A New Method of Testing

IN a note presented to the Academy of Sciences (*Compt. rend., T.*, 8 p., 427) J. J. Trillatt and A. Aubrey suggest a method for determining whether a given oil sample is rigorously non-polar. A drop of vaseline oil, which had been refined but to which impurities had been added, was dropped on the surface of water in a vessel, and its surface tension determined. It was noted that the tension curve showed a rapid drop in function of time, due to the selective adsorption of the polar molecules of impurities. This explanation was confirmed by photographing the adsorption according to Trillat's method. To make sure that the drop in surface tension was due to selective adsorption, the same oil was refined by Woog's method with active earth and the test repeated. No adsorption occurred. The method is, therefore, a test for the rigorous non-polarity of oil.

New Electro-Chemical Deposition Plant

Large and Up-to-Date Works of Fescol, Ltd.

THE new works of Fescol, Ltd., electro-depositors, at North Road, N.7, have now been completed; this is the second move in the Company's history to more commodious premises, the first being in 1926 from a small factory in South-East London to larger premises in Grosvenor Road, having a floor area of 24,000 sq. ft. By 1937 these had proved to be inadequate to deal with the volume of business and the new works at North Road, having a floor space of 40,000 sq. ft., were erected. In the new works, which we visited on Thursday, the most modern plant has been installed, and is said to be the largest of its kind in the world. Originally, metal deposition was carried out solely for decorative purposes, but by the Fescol process comparatively heavy deposits of metals on metals can be applied, which is of interest to all industrial metal users.

Unique Supply-Converter Plant

For the electric supply of the works, power is obtained from the generating station of the Borough of Islington. As this is single phase, it has to be converted to three phase, and for this purpose a substation has been installed. This substation, which supplies electricity for driving the machinery in the factory, contains a unique plant for converting the supply. The converters resemble ordinary three phase motors, and are equipped with condensers. The single phase supply is connected to two of the three terminals of the winding of each converter and the three phase is taken from all three terminals.

The condensers, besides being used for starting the converters, assist in the conversion and add considerably to the efficient working of the factory. The great advantages of this system of conversion are that it is much cheaper and costs much less to run than motor-alternator sets. This plant is supplied by the British Thomson-Houston Co.

After conversion to three phase the supply has to be turned into low voltage d.c. Motor generators and Westinghouse rectifiers (an illustration showing these rectifiers installed in the works was published in the July 16 issue, page 50) are employed for this purpose. There are two motor generator rooms, one supplyng the current for the nickel shop, the other that for the chromium shop. Each motor generator in the chromium shop is connected directly to the vat which it serves and is independently controlled. Some of the power supply for this shop is obtained through Westinghouse metal rectifiers. A total of 15 sets is in use giving a maximum output of 16,500 amperes, while 9 equipments, each having an output of 12 volts 1,500 amperes, are housed in a special substation.

Remote-Controlled Rectifier Sets

The rectifier sets are completely remote-controlled from the vats, the control being effected on the input side of the auto-transformer. The current taken from the mains is thus always proportional to the output of the rectifier and no wastage occurs. Two six-position on-load oil-immersed switches are used with each rectifier to enable the voltage to be controlled in 35 equal steps between 4 and 12 volts. The total of the power installation is 1,350 h.p., of 1,000 kW.

A battery of accumulators consisting of 9 cells, series paralleled, having a capacity of 21,600 amperes at 10 hours rate of discharge, supplied by the Chloride Electrical Storage Co., ensures continuity of electric current in the event of a temporary failure on the part of the power supply.

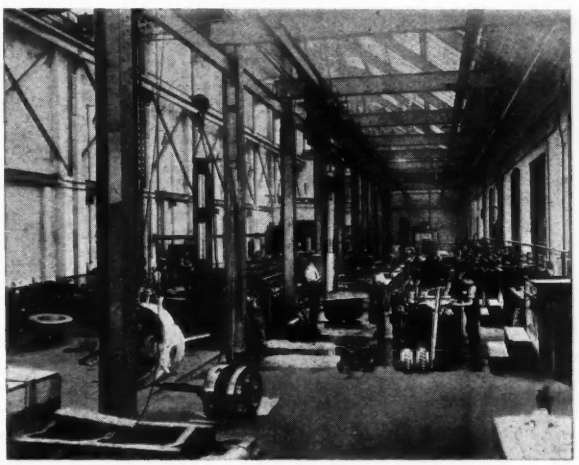
The nickel depositing shop is divided into three sections—heavy, medium and light. A 6-ton runway travels the whole length of the main bay and is used for loading and unloading heavy goods as well as for handling them in the vats. The vats themselves are 15 ft. deep by 12 ft. by 8 ft., and are constructed of ferro-concrete, lined with acid-resisting material. Shafts up to 20 ft. in length can be handled in the plant. Other runways serve the medium and light sections (which include, in addition to nickel, copper, cadmium and lead vats) so that man-handling is reduced to a minimum.

Specially Designed Chromium Shop

Adjacent to the nickel and inspection departments is a specially designed chromium shop. As in the case of the nickel shop, all vats are at a common and convenient height from floor level so as to facilitate handling, and there are no stagings or overhead obstructions. Each vat is supplied with current by an independent rectifier or generator. Cranes of three tons serve the heavy side of the department, which is capable of treating shafts up to 10 ft. 6 in. long.

Independently-driven polishing spindles are employed in a separate polishing shop in which particular attention has been given to lighting and ventilation, each spindle having a separate exhaust to the atmosphere. This shop is adjacent to the chromium and inspection departments.

In order to give efficient service to customers the company has installed an extensive machine shop, equipped with



The nickel depositing shop at the new works of Fescol, Ltd.

grinding, turning and screw cutting, milling, slotting, drilling and shaping machines. Included in these machines is the largest grinder of its kind in London, capable of dealing with shafts up to 26 ft. long by 2 ft. 6 in. diameter. Rolls of 37 in. diameter by 11 ft. long can be handled in special roll grinding machines.

The results obtained from electro-chemical deposition depend to a great extent on close control on the part of the laboratory. Further, research and development play a large part in such a young and progressive industry.

For these reasons a well equipped analytical and research laboratory, with an area of over 2,000 sq. ft., has been installed. In the inspection department all incoming and outgoing work is carefully inspected, dimensions taken and recorded.

The work undertaken by the Fescol process includes the deposition of nickel, chromium, copper, cadmium and lead, and, where required, the machining of the parts to size after treatment. Each type of metal deposited is selected in accordance with the individual requirements of the case under consideration. The process is used for the salvage of parts which have become worn in use, for the rectification of machine shop errors, for protection against corrosion, and for improving the quality of wearing surfaces, etc.

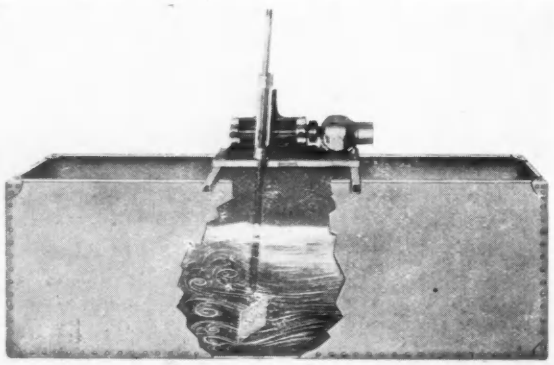
Mechanical Paddle Mixer

Kestner Co.'s New Product

THE Kestner Evaporator and Engineering Co., Ltd., chemical engineers, have just put on the market the Kestner Mechanical Paddle Mixer—a device which has the same motion as a paddle operated by hand.

The apparatus has a novel mechanism, the paddle operating as slowly as three strokes per minute or up to 50 if required, and it has the advantage that it can be arranged as a single or double paddle unit, and can be adjusted both as to length and number of strokes in a given time. The illustration shows the horizontal type of machine, which has a pendulum motion, the paddle of the stirrer moving in an arc, and producing a gentle agitation throughout the whole volume of the liquid. This arrangement is perfectly suited for use with rectangular or trough shaped tanks which are long in relation to their depth.

The company has also a vertical type of apparatus in which the mechanism imparts a reciprocating or plunger motion to the blade, or paddle, the design of which is ar-



ranged to suit the particular purpose for which it is required. The vertical type is most widely used for cylindrical vessels and steam jacketted kettles. The only parts coming in contact with the liquid are the shaft and paddle. These can be in any materials required, such as mild steel, stainless steel, copper, gunmetal, Keebush, wood, or any form of plating may be adopted.

The standard equipment includes the baseplate on which the mechanism is mounted, together with the paddles or blades, and the whole can be mounted on a plank or any convenient support above a tank. Belt or direct motor drive are available for both horizontal and vertical types. It is claimed that the advantages of the paddle mixer include simplicity of design, low running cost, compact and self-contained, readily moveable from vessel to vessel, low maintenance costs, easily interchangeable shaft and paddle, no contamination of product by grease or oil and belt or motor drive.

Oils from Coffee Grounds

Tests which would indicate that the oils in coffee grounds can be extracted on an industrial scale, for use in soap manufacture, have been carried out in Italy. The grounds are dried to remove excess moisture, and are then treated with a solvent. Carbon tetrachloride, carbon disulphide or ether are suitable for the purpose, and should be used hot. About 20 per cent. by weight of the grounds will come out under this treatment in the form of a mixture of glycerides of palmeic, oleic and linoleic acids, which can be removed from the solvents by evaporation. The grounds after treatment make an excellent fuel, being completely dehydrated. It is estimated that if the grounds which are thrown away by large users of coffee in Rome alone were collected for treatment, a production of 1 ton of oil per day could be attained.

Activation of Charcoal

Temperature on Adsorbing Properties

THE effect of activation of charcoal at different temperatures on its adsorbing properties has been studied by Bartell and Lloyd (J.A.C.S., 1938, *60*, 2,120-2,125). The charcoal used was prepared by charring sucrose, and heating the charred material in nitrogen at 950° for some time. That fraction of the product was used which passed a 300 mesh, and remained on a 350 mesh sieve.

Three types of activation of this stock charcoal were investigated: (1) heating in CO_2 for 5 hours at 1,000° C; (2) heating in CO_2 for 5 hours at 1,000° C. followed by heating in oxygen at 400° C. for a considerable time; (3) heating in oxygen at 150° C., for 2 hours, or treatment with a mixture of oxygen and ozone at 25° C. for 3½ hours. The products were then examined for preferential adsorption from ethanol-benzene mixtures, the data being plotted in terms of the amount of ethanol adsorbed per unit weight of adsorbent against the mol fraction ethanol in the solution.

It was found that the lower the temperature of activation, and the more strongly oxidising the activating gas, the more hydrophilic was the charcoal, judged by its preferential adsorption of ethanol. Thus the high temperature activated charcoal showed a preference for benzene, whereas ethanol was much more strongly adsorbed on organised charcoal, the material heated at 400° having a behaviour intermediate between the two. It is thought that with suitable treatment the stock charcoal could be made to show a hydrophilic activity very near to that of silica.

Cataphoretic studies showed that the high temperature activated, organophilic charcoal contained both negatively and positively charged particles; the latter settling very rapidly in water; the material showed only acid adsorption. The medium temperature product contained negatively charged particles and adsorbed bases only. The most hydrophilic charcoal also contained only negatively charged particles, but showed both base and acid adsorption.

Methods of Coal Analysis

British Standard Specification for Crucible Swelling Tests

A FURTHER step in the standardisation of methods of analysis of coal and coke has been taken by the publication of B.S.S. No. 804-1938—Methods for the Crucible Swelling Test for Coal. In the routine analysis of coal, some indication of the swelling power is obtained in certain of the tests, but as these tests are intended primarily for other purposes, a crucible swelling test has been standardised which will be a comparative measure of the swelling power of coal.

The crucible swelling test is based on a method devised in the laboratories of Messrs. Woodall-Duckham, the resulting button being compared with standard outlines. It has been found possible, by standardising conditions of test, to obtain reasonable concordance in the results. Full details of the method of test are given, together with a chart of the standard profiles and the corresponding swelling numbers, and details of the development of the method are included in an appendix.

Copies of this British Standard can be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 2d. post free.

A NEW synthetic ammonia factory will be put into production at Auby in a few months by the Société des Produits Chimiques et Engrain d'Auby. With a daily output capacity of 35 tons anhydrous ammonia (which can be doubled when needed) the concern will be able to produce all the ammonia required for its range of nitrogenous and mixed fertilisers.

Personal Notes

MR. GEORGE L. TURNER, of John Harris and Son, varnish manufacturers, left £46,656, net personalty £39,460.

SIR ROBERT MOND was taken seriously ill at his Dinard, Brittany, home last week. He was removed in an ambulance to Paris.

J. T. MCCOMBIE, a school boy of the City of Norwich School, has been elected to a scholarship at the Imperial College of Science, South Kensington.

MR. MEREDITH WOOLDRIDGE THRING, B.Sc., was presented with the Students' Medal for a thesis entitled "The Measurement of Temperature of Producer Gas."

SIR KENNETH LEE, chairman of Tootal Broadhurst Lee Co., Ltd., has been appointed by the Medical Research Council to fill a vacancy in the membership of their Industrial Health Research Board.

PROFESSOR RICHARD VERNON WHEELER, D.Sc., F.G.S., F.I.C., was presented with the Melchett Medal of the Institute of Fuel for the year 1938 at the annual dinner of the Institute held at the Connaught Rooms, London, on October 13.

MR. FRANK FANCUTT, F.I.C., A.M.I.Chem.E., has been awarded a Telford Premium by the Institution of Civil Engineers for his paper on "The Work of the Paint Research Laboratory of the London, Midland and Scottish Railway Company," given during the 1937-38 Session.

MR. G. M. MACFARLANE, who has been manager of the smelting department at Messrs. William Beardmore's Parkhead Forge, Glasgow, for the past fourteen years, was made a presentation by the workers on the occasion of his retirement owing to ill-health, at a recent gathering of the Parkhead No. 1 branch of the British Iron, Steel, and Kindred Trades' Association.

PROFESSOR W. N. HAWORTH, of Birmingham University, was presented with his portrait and an illuminated book at a meeting of the Chemical Society of Birmingham University on Monday in recognition of his being awarded the Nobel Prize for Chemistry in 1937. The book contains the names of the subscribers and an inscription recording that Professor Haworth is the first British organic chemist to receive the Nobel Prize.

AT A MEETING of the Board of the Institute of Physics, held on October 12, the following were elected to membership: Fellows: H. S. Barlow, M.Sc.; D. V. Gogate, M.Sc.; S. T. Henderson, M.A., B.Sc., Ph.D.; P. S. H. Henry, B.A., Ph.D.; G. H. Munro, M.Sc.; J. E. Roberts, B.Sc., Ph.D. Associates: S. C. Baker, M.Sc.; N. D. Hill, B.Sc.; H. R. L. Lamont, M.A., B.Sc.; C. J. Milner, M.A., Ph.D.; S. H. Noble, B.Sc.; J. Savage, B.Sc.; H. W. Wood, M.Sc.

SIR CECIL M. WEIR, chairman of the Administrative Committee of the Empire Exhibition, Glasgow, PROFESSOR G. BARGER, DR. J. O. CUTTER, MR. R. O. FULTON, MR. A. J. GIBSON, MR. WHITAKER, MR. W. E. WORNUM, and MR. J. MILLIGAN, chairman of the Scottish branch of the Oil and Colour Chemists' Association, were among the principal guests at a dinner and dance in the Grosvenor Restaurant, Glasgow, on October 14, which was given by the branch to fellow chemists on a visit to the Exhibition.

SIR HAROLD CARPENTER, F.R.S., Professor of Metallurgy at the Royal School of Mines, was presented with the Honorary Membership of the American Institute of Mining and Metallurgical Engineers at a luncheon given in his honour at the Savoy Hotel, London, on Tuesday, in recognition of his "distinguished achievements in the field of metallurgy as an investigator, teacher, administrator, and organiser and director of research." The presentation was made by Dr. John F. Thompson, executive vice-president of the International Nickel Co. of Canada, and tributes to Sir Harold were also paid by Dr. W. H. Hatfield and Principal C. A. Edwards.

OBITUARY

MR. JOHN THOMAS PURSSGLOVE, formerly manager of the Salem Chemical Works, New Mills, near Bolton, died on October 12 at the age of 76.

SIR WILLIAM JOHN JONES, the well-known engineer, died on October 13, at the age of 71. During the Great War he was Director of Refractories and also Deputy-Controller of the Iron and Steel Productions Department of the Ministry of Munitions. He was a director of Dorman, Long and Co., Ltd.

Foreign Chemical Notes

Russia

IMPORTANT SHALE OIL DEPOSITS have been discovered in the Kara Tau Mountains of South Kasakstan.

Denmark

OIL-PROSPECTING OPERATIONS are being carried out at Haderslev in Southern Jutland by the "Danish-American Concession Company."

Jugoslavia

A CELLULOSE BLEACHING PLANT with a considerable output is being erected by the Drvar Cellulose Factory, which is run by the State-owned Sipad Co.

Bulgaria

THE NUCLEUS OF A ROSIN INDUSTRY has been formed with a small distilling plant at Ladjene in the heart of the pine forests of the Rhodope Mountains.

Latvia

THE GOVERNMENT IS PARTICIPATING in the formation of a new company (styled "Atoms") to engage in the manufacture and distribution of soaps and perfumes.

Finland

SOAPS AND COSMETICS will be among the products to be manufactured by the new Helsingfors concern of Sokeain Teknillinen Tehdas Teo O/Y (capital 75,000 Finnish marks).

Belgium

FORMATION IS ANNOUNCED OF THE SOC. BELGE DES RESINES ET COLLOIDES "SILBRECOL" at Lüttich with a capital of 225,000 francs to engage in the manufacture of organic glass, safety glass, wood-impregnating materials, etc.

France

A DEPOSIT OF GREEN BAUXITE located in the Department of the Pyrenées-Orientales and containing 62.5 per cent. alumina, 7 per cent. oxide and 0.9 per cent. calcium carbonate is to be exploited with a view to the production of pigments.

Sweden

A NEW MEDICINAL CHEMICAL FACTORY is being erected by the A.B. Ferrosan, of Malmo.

PRELIMINARY EXPERIMENTAL WORK ON THE UTILISATION OF BEECH WOOD carried out by Professor Hägglund on behalf of the Academy of Engineering Science has revealed its suitability as a raw material for rayon.

A CORRECTION

We are informed by Cefoil Ltd., that the report concerning the construction of a seaweed utilisation factory in South Uist (THE CHEMICAL AGE, September 3, 1938, page 184) is incorrect in that no fixed plans have been made for erecting the factory there. The site is considered suitable as a seaweed collecting depôt and the absence of activity there is due solely to the inconvenience of operating on a small scale.

British Overseas Chemical Trade in September

ACCORDING to the Board of Trade returns for the month ended September 30, 1938, imports of chemicals, drugs, dyes and colours were valued at £1,170,142, as compared with £1,235,037 for September, 1937, a decrease of £64,895. Exports were valued at £1,726,474 as compared with £2,046,380, a decrease of £319,906. Re-exports were valued at £39,270.

Imports

	Quantities. September 30, 1937.	Quantities. September 30, 1938.	Values. September 30, 1937.	Values. September 30, 1938.
Acids—				
Acetic .. .. cwt.	9,659	11,148	11,003	13,855
Boric (boracic) .. ,,	6,425	3,210	7,047	3,437
Citric .. .. ,,	1,371	1,450	5,454	5,885
Tartaric .. ,,	1,490	1,500	6,195	6,958
All other sorts .. value	—	—	9,820	6,331
Borax .. .. cwt.	28,638	23,520	17,704	13,925
Calcium carbide .. ,,	82,045	65,001	43,293	31,212
Fertilisers, manufactured—				
Superphosphate of lime tons	—	25	—	63
All other descriptions ,,	1,658	3,125	9,932	17,736
Potassium compounds—				
Caustic and lyes cwt.	10,881	14,449	11,361	15,861
Chloride (muriate) ,,	373,960	394,985	118,206	131,517
Kainite and other potassium fertiliser salts cwt.	245,886	185,406	47,718	35,292
Nitrate (saltpetre) ,,	9,318	8,288	6,380	6,315
Sulphate .. ,,	153,340	227,161	70,970	104,061
All other compounds ,,	12,236	13,854	12,964	18,485
Sodium compounds—				
Carbonate, including soda crystals, soda ash and bicarbonate cwt.	200	61	77	52
Chromate and bichromate .. .. cwt.	1,834	622	2,067	871
Cyanide .. .. ,,	2,063	1,251	4,782	3,545
Nitrate .. .. ,,	133,601	103,952	32,999	25,590
All other compounds ,,	19,162	22,579	16,220	18,032
Chemical manufactures value	—	—	321,445	264,934
Drugs, medicines and medicinal preparations—				
Quinine and quinine salts .. .. oz.	82,636	173,356	6,556	15,141
Medicinal oils .. cwt.	2,633	2,226	10,410	5,567
Proprietary medicines value	—	—	82,435	67,349
All other sorts .. ,,	—	—	38,899	35,041
Finished dye-stuffs obtained from coal tar cwt.	2,720	3,485	82,365	109,663
Extracts for dyeing ,,	3,783	5,483	10,282	12,155
Extracts for tanning (solid or liquid)—				
Chestnut .. cwt.	30,553	25,107	19,840	17,447
Quebracho .. ,,	30,556	26,711	28,468	24,230
All other sorts .. ,,	39,239	33,263	31,175	28,590
All other dyes and dye-stuffs .. .. ,,	1,565	541	12,630	17,730
Painters' and printers' colours and materials—				
White lead (basic carbonate) .. cwt.	4,992	5,537	8,205	7,685
Lithopone .. ,,	30,301	26,668	18,057	15,729
Ochres and earth colours cwt.	25,331	24,780	8,826	8,564
Bronze powders and other metallic pigments .. .. cwt.	1,784	1,256	13,100	10,351
Carbon blacks .. ,,	49,882	26,304	69,836	35,612
Other pigments and extenders, dry .. cwt.	53,684	24,109	12,399	6,619
All other descriptions ,,	12,167	14,843	25,917	28,712
Total .. .. value	—	—	1,235,037	1,170,142

Exports

	Quantities. September 30, 1937.	Quantities. September 30, 1938.	Values. September 30, 1937.	Values. September 30, 1938.
Acids—				
Citric .. .. cwt.	3,164	2,634	14,271	11,644
All other sorts .. value	—	—	29,843	21,419
Aluminium compounds tons	2,115	3,335	13,903	32,737
Ammonium compounds—				
Sulphate .. tons	24,675	19,672	152,947	126,819
All other Sorts .. ,,	521	2,742	9,377	31,834
Bleaching materials—				
Bleaching powder (chloride of lime) .. cwt.	80,003	39,220	19,944	11,807
All other sorts .. ,,	6,940	3,917	15,352	10,018
Coal tar products—				
Cresylic acid .. galls.	219,609	114,911	43,425	13,580
Tar oil, creosote oil ,,	5,817,782	1,814,548	145,579	45,478
All other sorts .. value	—	—	14,100	14,551
Copper, sulphate of tons	1,482	2,203	30,139	35,648
Disinfectants, insecticides, etc. .. .. cwt.	37,713	34,364	81,820	67,960
Fertilisers, manufactured tons	32,521	7,233	85,891	42,137
Glycerine .. .. cwt.	9,298	3,556	41,642	9,664
Lead compounds .. ,,	13,431	13,090	22,871	18,568
Magnesium compounds tons	475	463	9,749	11,123
Potassium compounds cwt.	3,782	5,692	8,925	12,683
Salt (sodium chloride) tons	33,483	23,092	74,532	61,867
Sodium compounds—				
Carbonate, including soda crystals, soda ash and bicarbonate cwt.	314,418	268,614	66,587	65,079
Caustic .. .. ,,	203,673	178,671	91,602	89,899
Nitrate .. .. ,,	3,128	2,710	1,117	929
Sulphate, including salt-cake .. .. cwt.	12,892	26,067	1,966	4,260
All other sorts .. ,,	73,904	58,665	77,638	72,178
Chemical manufactures and products .. value	—	—	16,990	21,661
Drugs, medicines and medicinal preparations cwt.	—	—	12,493	15,219
Zinc oxide .. tons	950	1,284	23,282	22,557
All other descriptions value	—	—	227,024	199,353
Drugs, medicines and medicinal preparations—				
Quinine and quinine salts .. oz.	291,824	175,470	31,479	18,196
Proprietary medicines value	—	—	120,061	123,708
All other descriptions value	—	—	142,682	160,773
Dyes and dye-stuffs and extracts for dyeing and tanning—				
Finished dye-stuffs obtained from coal tar—				
Alizarine, alizarine red and indigo (synthetic) cwt.	2,417	614	12,620	6,325
Other sorts .. ,,	5,825	5,484	85,972	85,089
Extracts for tanning (solid or liquid) cwt.	20,540	19,490	19,194	17,430
All other descriptions cwt.	1,333	1,136	6,669	5,452
Painters' and printers' colours and materials—				
Ochres and earth colours cwt.	10,888	10,587	11,146	11,176
Other descriptions ,,	19,914	18,234	32,400	33,173
White lead .. ,,	4,949	5,382	11,546	10,392
Ships' bottom compositions .. .. cwt.	2,867	2,690	10,940	9,373
Paints and painters' enamels .. .. ,,	41,497	32,656	121,477	96,758
Varnish and lacquer (clear) .. galls.	78,093	55,986	32,869	22,614
Printers' ink .. cwt.	3,998	3,600	23,016	18,837
All other descriptions ,,	42,169	39,688	80,783	73,386
Total .. .. value	—	—	2,046,380	1,726,474

Re-Exports

	Quantities. September 30, 1937.	Quantities. September 30, 1938.	Values. September 30, 1937.	Values. September 30, 1938.
Dyes and dye-stuffs and extracts for dyeing and tanning .. .. cwt.	183	389	754	1,595
Painters' and printers' colours and materials cwt.	1,044	395	1,407	795
Total .. .. value	—	—	31,644	39,270

From Week to Week

EXTENSIONS are to be carried out at the works of the Birmingham Battery and Metal Company, Ltd.

WE ARE INFORMED that the improved gas generator, details of which were given on page 300 of our last issue, is supplied by Baird and Tatlock (London), Ltd.

THE COMMITTEE of the West Riding Section of the Society of Dyers and Colourists organised a two-day exhibition of scientific and technical instruments at the Technical College, Bradford, last week.

HIGH DUTY ALLOYS, LTD., and their associated company, Magnesium Castings and Products, Ltd., are establishing a factory in Windsor Road, Redditch, where construction has already commenced.

THE NEW SQUIBB INSTITUTE FOR MEDICAL RESEARCH, New Brunswick, N.J., was opened on October 11. The speakers included Mr. Carleton H. Palmer, Mr. Theodore Weicker, and Dr. John F. Anderson, President, chairman of the Board, and vice-President respectively, of E. R. Squibb and Sons.

SIR HAROLD HARTLEY, president of the Institute of Vitreous Enamellers, and LADY HARTLEY, will preside at the annual banquet of the Institute at the Normandie Hall, Knightsbridge, London, S.W.1, on October 28. Among the principal guests who have accepted invitations are Sir David and Lady Milne-Watson, Sir Hugh Elles and Miss Elles, Professor and the Hon. Mrs. Egerton, and Sir William and Lady Larke.

MEETINGS OF THE LIVERPOOL SECTION OF THE SOCIETY OF CHEMICAL INDUSTRY were resumed yesterday (Friday), when Mr. B. D. W. Luff, the chairman, gave an address on "Chemists and Cargoes." As usual, chemical societies of Liverpool, comprising the Society of Chemical Industry, the Institute of Chemistry, the British Association of Chemists, and the Chemical Society, have issued a joint syllabus giving details of all the meetings to be held during the ensuing six months.

SIR GEORGE GILLETT, Commissioner for the Special Areas, officially opened the St. Helens Auckland Industrial site on October 14. The site is part of the Government scheme of aid to the Special Areas, and its inception has been largely due to the efforts of the South-West Durham Improvement Association and Development Board. North Eastern Trading Estates, Ltd., the company responsible for the Team Valley Trading Estate, manage the site on behalf of the Commissioner for the Special Areas.

BUILT AT A COST OF £70,000, and capable of a production of 50,000 tons per annum, the latest factory at Ipswich, of Fison, Packard and Prentice, Ltd., the well-known chemical fertiliser manufacturers, was inaugurated on October 13, by Lord Cranworth, chairman of the Land Fertility Committee, when many guests, including agricultural scientists and farmers were present. At this factory the firm will produce their latest granular compound fertiliser containing phosphates, nitrogen and potash in correct fertilising quantities. The factory is situated on the eastern bank of the River Orwell.

THE JOINT COMMITTEE ON MATERIALS AND THEIR TESTING is organising a meeting which will be held under the auspices of the Institution of Electrical Engineers on November 25 to discuss the methods of Non-destructive Testing. The subjects to be discussed include: Magnetic and Electrical Methods; X- and Gamma-rays; Acoustical and General Methods. The meeting will be held at the Institution of Electrical Engineers under the Presidency of Dr. A. P. M. Fleming, President of that Institution. A general invitation to attend is extended to all those who are interested. Applications for advance copies of the papers should be addressed to the Secretary, The Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2.

IN A PRELIMINARY REVIEW ISSUED BY THE ALUMINIUM INFORMATION BUREAU, it is stated virtually all the world's supply of bauxite is produced in ten countries, namely, France, Hungary, the U.S.A., Dutch Guiana, British Guiana, Italy, Jugoslavia, the U.S.S.R., the Dutch East Indies and Greece. The last two of these are new producers, output from both these countries being negligible prior to 1935. Every bauxite-producing country has made substantial progress since 1935. France, though the leading producer, shows the smallest increase, production in 1937 being 34 per cent. higher than in 1935. Production in Dutch Guiana has increased to nearly 3½ times, and in British Guiana to over 2½ times, the quantity produced in 1935. Production has more than doubled in Hungary and in Italy, while the U.S.A., Jugoslavia and the U.S.S.R., show increases of 78 per cent., and 77 per cent. respectively. Germany is second only to the U.S.A. as a producer and consumer of aluminium, but has only small domestic supplies of bauxite. The raw material for Germany's aluminium is obtained from Hungary, Jugoslavia, France and Italy. About sixty per cent. of Britain's requirements of aluminium is imported in the form of metal, principally from Canada, but the remaining forty per cent. is produced chiefly from imported bauxite.

A SPECIAL BUILDING FUND APPEAL on behalf of the two divisions of Durham University was launched yesterday (Friday). It is hoped to raise £350,000, of which about £200,000 is needed for science buildings.

THE FURNACES at the Frodingham Steel plant of the Appleby Frodingham Steel Company at Scunthorpe, were re-started this week after remaining idle since the beginning of August owing to the unsettled outlook.

THE ANNUAL UNILEVER DRAMA FESTIVAL for the Lord Leverhulme Cup took place on October 15, Lord Leverhulme presenting the trophy to the winning company, the Crosfield Dramatic Society, before an audience of 600 employees.

THE EXHIBITION OF INVENTIONS, organised by the Institute of Patentees, which was postponed during the crisis, has now been fixed for February 15 to 20 inclusive at the Royal Horticultural Society's Old Hall, Vincent Square, S.W.

THE BIRMINGHAM GROUP of the Society of Chemical Industry is holding a dinner at the New Inns Hotel, Handsworth, Birmingham, on November 1, when the guest of honour will be Viscount Davidson, president of the Institute of Industrial Administration.

SPEAKING AT THE ANNUAL DINNER of the Institute of Fuel held at the Connaught Rooms, London, on October 13, Captain Crookshank, M.P., Secretary for Mines, said that up to the present he had signed licences for the exploration of oil covering more than one-quarter of the acreage of England.

TWENTY-SEVEN FACTORIES were engaged in Canada last year in the production, as their main products, of compressed gases including oxygen, acetylene and carbon dioxide (in cylinders), as well as hydrogen, ammonia, solid carbon dioxide nitrogen and nitrous oxide. Production was valued in all at $3,929,242, as compared with $3,360,220 in 1936.

THE NATIONAL SMOKE ABATEMENT SOCIETY have just published under the title of "Britain's Burning Shame," a new survey of the ravages caused by atmospheric pollution. The book, which is graphically written and profusely illustrated, contains a foreword by Professor John Hilton, who emphasises that smoke is not a necessary evil.

SOLOCHROME BLACK PGS is a new addition to the I.C.I. range of chrome dyestuffs. Because of its excellent all-round fastness properties it can be used on loose wool, slubbing and yarn where the highest standards are demanded. It is pointed out that the chief interest of Solochrome Black PGS is its superiority in exhausting properties to Solochrome Black PVS.

THE DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH is presenting at the Imperial Fruit Show and Canners' Exhibition, to be held at the Coliseum, Bristol, from October 28 to November 5, an exhibit devoted entirely to the gas storage of fruit. The exhibit is in three sections; the first tells in a simple way what gas storage really is, and the others deal with research and the commercial application of gas storage respectively.

THE IMPORT DUTIES ADVISORY COMMITTEE is considering an increase in the import duty on foreign zinc from 12s. 6d. to 30s. per ton, according to the *Financial News*. Empire zinc would remain on the free list, and the premium of 12s. 6d. per ton which it at present commands over the London Metal Exchange contract would be raised to 30s. per ton. The object of the plan is to leave the home market free to Empire exporters, and at the same time give some protection to domestic refiners. It is anticipated that a maximum limit will be fixed for domestic production.

THE BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION has issued two booklets on factory lighting to factories in connection with its campaign to provide expert lighting guidance, free of charge, to factory owners in view of the recommendations of the new Factories Act They are titled, "Light Measurement," and "Lighting for Production." The first-named contains, among other interesting data, a description of the lightmeter said to revolutionise lighting practice in industry and the second booklet, "Lighting for Production," emphasises the increased efficiency of workshops when good lighting is installed.

Ten Years Back

From "The Chemical Age," October 20, 1928

The new laboratories at Sheffield for Safety in Mines Research were opened by Mr. Stanley Baldwin on Thursday, October 11.

* * * *

The last British zinc blende mine, at Threlkeld, Keswick, owned by Marple and Gillott, Ltd., of Sheffield, was closed on Saturday, October 13.

* * * *

Mr. H. Leaton Edwards, F.I.C., manager of the Raw Materials Laboratory, Lever Brothers, Ltd., died at Birkenhead, on Friday, October 12, aged 71. He was with the firm for more than 40 years.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

MANUFACTURE OF QUINOLINE COMPOUNDS.—I. G. Farbenindustrie. (Germany, Oct. 7, '37.) 27673.

MANUFACTURE OF SUBSTANTIVE GREEN POLYAZODYESTUFFS.—I. G. Farbenindustrie. (Germany, Sept. 27, '37.) 28040.

MANUFACTURE OF SYNTHETIC RUBBER-LIKE MATERIALS.—I. G. Farbenindustrie.) (Germany, Sept. 29, '37.) 28222.

MANUFACTURE OF NEW POLYMERIC PRODUCTS of rubber-like character.—I. G. Farbenindustrie. (Germany, Sept. 30, '37.) 28223.

PRODUCTION OF DYESTUFFS ON THE FIBRE.—I. G. Farbenindustrie. (Germany, Oct. 1, '37.) 28245.

PRODUCTION OF HYDROCARBON GASES by hydrogenation of carbonaceous materials.—Institution of Gas Engineers, and F. J. Dent. (Oct. 12, '37.) 27772.

PRODUCTION OF SOAP.—A. W. Keeble. 28243.

MANUFACTURE OF AZO DYESTUFFS insoluble in water.—A. Kershaw, K. H. Saunders, and Imperial Chemical Industries, Ltd. 27669.

MANUFACTURE OF HYDROCARBONS from carbon monoxide, etc.—H. Koppers' Industrieele Maatschappij N.V. (Germany, Sept. 23, '37.) 27807; (Germany, March 12.) 27808.

CALCIUM SULPHATE PLASTERS, ETC.—V. Lefebure, J. J. Etridge, and Imperial Chemical Industries, Ltd. 28253.

PREPARATIONS FOR SOFTENING, ETC., PAINT, ETC.—A. Macdonald. 28067.

MANUFACTURE OF HETEROCYCLIC COMPOUNDS of the diazaline series.—Sir G. T. Morgan, and J. Stewart. 28185.

SEPARATING TWO OR MORE HYDROCARBON FRACTIONS from hydrocarbon mixtures.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (France, Oct. 12, '37.) 28256.

PRODUCTION OF BERYLLIUM.—J. E. Pollak (Richardson). 27852.

PRODUCTION OF ARTIFICIAL THREADS from cellulose solutions.—Rheinische Zellwolle, A.-G. (Germany, Sept. 23, '37.) 27810.

APPARATUS FOR DEGREASING METAL, ETC.—J. Shaw, and Imperial Chemical Industries, Ltd. 27819.

ALLOYS FOR PERMANENT MAGNETS.—Siemens and Halske, A.-G. (Germany, Sept. 27, '37.) 28149, 28150.

MANUFACTURE OF MELAMINE.—Soc. of Chemical Industry in Basle. (Germany, Oct. 5, '37.) 27636.

PREPARATION OF HIGH-MELTING POINT ALLOYS, ETC.—A. H. Stevens (Goldsmith Bros. Smelting and Refining Co.). 28213.

TREATMENT OF HYDROCARBON OIL.—A. H. Stevens (Phillips Petroleum Co.). 28118.

MANUFACTURE OF SULPHURIC ACID.—W. W. Triggs (Soc. Generale Metallurgique de Hoboken). (Dec. 24, '37.) 28016.

MANUFACTURE OF ESTERS 2-oxybutadiene-1:3.—Dr. A. Wacker Ges. für Elektrochemische Industrie Ges. (Germany, Sept. 25, '37.) 27906.

PRODUCTION OF MOTOR FUEL.—Anglo-Iranian Oil Co., Ltd., A. E. Dunstan, and S. F. Birch. 28392.

SOLVENT EXTRACTION OF MINERAL OILS.—C. Arnold (Standard Oil Development Co.). 28378.

RENDERING TEXTILES WATER-REPELLENT.—N. E. Brookes (Färberei-A.-G. vorm. E. Stolte Nachf. and W. Missy). (March 31, '37.) 28461.

METHOD, ETC., OF EMPLOYING CARBON DIOXIDE as a fire-extinguishing medium.—Cardox (Great Britain), Ltd. 28605.

PREPARATION OF AQUEOUS SOLUTIONS of *P*-aminobenzenesulphonamide particularly for injection purposes.—Chemische-Pharmazeutische, A.-G. Bad Homburg. (Germany, Nov. 30, '37.) 28502.

PREPARATION OF STABLE AQUEOUS SOLUTIONS containing *K*-strophanthin theophylline and dextrose of concentrations suitable for injection purposes.—Chemische-Pharmazeutische, A.-G. Bad Homburg. (Germany, Dec. 7, '37.) 28503.

METHOD OF PURIFYING AIR, ETC.—Concordia Elektrizitäts-A.-G. (Germany, Aug. 18.) 28937.

PREPARATION OF CARBON TETRACHLORIDE.—Consortium für Elektrochemische Industrie Ges. (Germany, Oct. 4, '37.) 28739.

RECORDING OF VARIATIONS in the chemical composition of a substance.—Courtaulds, Ltd., and R. S. Thomas. 28799.

MANUFACTURE OF MATERIALS FOR EXTRUSION.—E. I. du Pont de Nemours and Co. (United States, Sept. 30, '37.) 28488.

PRODUCTION OF TITANIUM DIOXIDE PIGMENTS.—E. I. du Pont de Nemours and Co. (United States, Oct. 2, '37.) 28518.

MANUFACTURE OF FIRE-EXTINGUISHING PREPARATIONS.—G. H. Durston, W. M. Herrmann, M. R. Lang, and W. Bleyberg. 28343.

DEHYDRATION OF OIL.—W. J. Fraser and Co., Ltd., and C. M. Auty. 28743.

MANUFACTURE OF CRESOLS, ETC.—W. W. Groves (I. G. Farbenindustrie.) 28345.

PREPARATION OF SALTS OF SULPHO-CARBOXYLIC ACID.—B. R. Harris. (United States, Feb. 11.) 28816.

SYNTHETIC CONTACT MASSES, ETC.—Houdry Process Corporation. (United States, Oct. 23, '37.) 28782; (United States, Nov. 17, '37.) 28783.

MANUFACTURE OF MANNITOL.—Howards and Sons, Ltd., J. W. Blagden, and G. C. Clark. 28455.

MANUFACTURE OF COMPOUNDS OF THE CYCLOPENTANOPOLYHYDROPHENANTHRENE SERIES.—I. G. Farbenindustrie. (Germany, Oct. 2, '37.) 28668.

MANUFACTURE OF CHLORINE, ETC.—Imperial Chemical Industries, Ltd. (July 20.) (Holland, Oct. 30, '37.) 28578.

PRODUCTION OF GLUTARIC ACID SALTS of highly alkylated guanidines, etc.—E. Kantorowicz. 28641.

SMELTING ACID ORES.—Kohle-und Eisenforschung Ges. (Germany, Nov. 9, '37.) 28529.

PROCESS FOR SMELTING ACID ORES.—Kohle-und Eisenforschung Ges. (Germany, Nov. 15, '37.) 28833, 28834.

Complete Specifications Open to Public Inspection

PRODUCTION OF STEEL.—Rochling'sche Eisen und Stahlwerke, Ges. April 2, 1937. 22451/37.

PRECIPITATING ZINC SULPHIDE.—Non-Ferrous Metal Products Ltd. April 1, 1937. 5306/38.

HYDROGEN SULPHIDE RECOVERY.—Non-Ferrous Metal Products, Ltd. April 1, 1937. 5307/38.

MANUFACTURE OF AZO-DYESTUFFS.—I. G. Farbenindustrie. March 27, 1938. 5557/38.

PROCESS FOR THE MANUFACTURE OF SULPHINIC-ACID DERIVATIVES. Schering, A.-G. March 27, 1937. 8039/38.

THERAPEUTICALLY ACTIVE ORGANIC COMPOUNDS, and the process for their preparation.—Soc. des Usines Chimiques Rhone-Poulenc. April 1, 1937. 8293/38.

MANUFACTURE OF POTASSIUM PERSULPHATE.—B. Laporte, Ltd. March 31, 1937. 8632/38.

MANUFACTURE OF KETONES or secondary alcohols of the cyclopentano-polyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. March 29, 1937. 8913/38.

MANUFACTURE OF NITRATES.—H. Pauling. March 27, 1937. 9086/38.

REFRACTORY COMPOSITIONS.—General Motors Corporation. March 31, 1937. 9162/38.

TREATMENT OF METALS.—United Engineering and Foundry Co. April 1, 1937. 9198/38.

MANUFACTURE OF DERIVATIVES OF PREGNENE-DIONE.—Naamlooze Vennootschap Organon. March 29, 1937. 9396/38.

HYDROXYALKYL CYANINE DYE and photographic emulsions.—Kodak, Ltd. March 29, 1937. 9535/38.

TREATMENT OF FABRICS which contain yarns comprising organic derivatives of cellulose.—British Celanese, Ltd. April 3, 1937. 9741/38.

MANUFACTURE OF CHEMICAL COMPOUNDS.—Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler. April 1, 1937. 9906/38.

CONVERTIBLE ESTERS.—American Cynamid Co. April 1, 1937. 9986/38.

MANUFACTURE OF DRIERS.—I. G. Farbenindustrie. April 1, 1937. 10006/38.

AZO DYES.—Chemical Works, formerly Sandoz. April 3, 1937. 10026/38.

PRODUCTION OF CHLORITES.—Mathieson Alkali Works. April 1, 1937. 10054/38.

MANUFACTURE OF SULPHURIC ACID.—Imperial Chemical Industries, Ltd. April 2, 1937. 10085/38.

HARD ALLOYS.—British Thomson-Houston Co., Ltd. April 2, 1937. 10126/38.

PRODUCTION OF UNSATURATED ALCOHOLS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 3, 1937. 10130/38.

PRODUCING DIAZOBIGUANIDES.—Calco Chemical Co., Inc. April 2, 1937. 10141/38.

MANUFACTURE OF METALLIFEROUS AZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. April 3, 1937. 10244/38.

PROCESS FOR THE MANUFACTURE OF PURE 4-AMINO-BENZENE SULPHONAMIDE.—I. G. Farbenindustrie. April 3, 1937. 10324/38.

MANUFACTURE OF ESTERS OF UNSATURATED ACIDS.—E. I. du Pont de Nemours and Co. April 3, 1937. 10330/38.

PRODUCTION OF METALLIC MAGNESIUM.—Magnesium Elektron, Ltd. April 5, 1937. 3955/38.

MANUFACTURE OF HYDROCARBON POLYMERS.—Standard Oil Development Co. April 9, 1937. 4485/38.

METHODS OF CLEANING MAGNESIUM and magesium base alloy surfaces and aqueous cleanjng solutions for use therein.—American Magnesium Corporation. April 7, 1937. 9192/38.

PROTEIN MATERIAL AND PROCESS OF MAKING SAME.—Soysein Process Corporation. April 6, 1937. 9232/38.

ACYLATED ETHERS and process for making same.—Rohm and Haas Co. April 8, 1937. 9845/38.

METHOD OF PRODUCING TABLETS OF SODIUM PEROXIDE, and tablets produced by said method.—G. Parizot. April 5, 1937. 10040/38.

MANUFACTURE OF VAT DYESTUFFS.—E. I. du Pont de Nemours and Co. April 5, 1937. 10471/38.

MANUFACTURE AND PRODUCTION OF GLYCERIDES suitable as edible oils and fats.—I. G. Farbenindustrie. April 6, 1937. 10313/38.

PRODUCTION OF UNSATURATED KETONES.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 6, 1937. 10460/38.

Specifications Accepted with Date of Application

DEPHOSPHURISING and/or desulphurising of steel.—H. A. Brassert, and H. A. Brassert and Co., Ltd. Dec. 21, 1936. 492,740.

SELF-EMULSIFYING COMPOSITIONS and aqueous emulsions thereof.—W. W. Triggs (E. I. du Pont de Nemours and Co.). Jan. 21, 1937. 492,742.

OLIGODYNAMIC TREATMENT OF LIQUIDS.—Katadyn, A.-G. Jan. 24, 1936. 492,745.

MANUFACTURING FLUORESCENT GLASS.—Soc. A.R.L. Jerome and Bonnefoy and Cie. Jan. 30, 1936. 492,960.

MANUFACTURE OF ACID WOOL DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) Feb. 23, 1937. 492,749.

PURIFICATION OF DRINKING WATER, water for general purposes, waste liquors, and aqueous and non-aqueous solutions and liquids.—E. Berl. March 24, 1937. 493,069.

PRODUCTION OF RESINOUS COMPOSITIONS.—Naamlooze Vennootschap Industrielle Maatschappij Voorheen Noury and Van Der Lande. March 27, 1936. 492,965.

PROTECTING METAL SURFACES by electrodeposition.—Crosse and Blackwell, Ltd., C. G. Sumner, R. I. Johnson, and W. Clayton. March 30, 1937. 492,900.

PRODUCTION OF WATER-GAS.—Power-Gas Corporation, Ltd., N. E. Rambush, and A. T. Grisenthwaite. March 30, 1937. 493,046.

MANUFACTURE OF CARBOXYLIC ACIDS of the hydroaromatic series. I. G. Farbenindustrie. March 28, 1936. (Sample furnished.) 493,055.

CARBURISING OF IRON, steel, and alloy steels.—Rodman Chemical Co. May 1, 1936. 493,058.

PROCESS FOR THE MANUFACTURE OF DIAZOTISABLE DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) March 30, 1937. 493,104.

MANUFACTURE AND PRODUCTION OF AZO DYESTUFFS containing metal.—G. W. Johnson (I. G. Farbenindustrie.) March 30, 1937. 492,902.

ELECTROTHERMIC PRODUCTION OF COMPACT METALLIC MAGNESIUM by reduction of oxidic magnesium compounds.—American Magnesium Metals Corporation. April 2, 1936. 493,064.

ELECTRO-DEPOSITION OF METALS.—A. R. Thomas. March 31, 1937. 493,108.

MANUFACTURE OF SUBSTITUTED ALIPHATIC CARBOXYLIC ACIDS.—W. W. Groves (I. G. Farbenindustrie.) March 31, 1937. 493,109.

MANUFACTURE OF SULPHONATION PRODUCTS.—W. W. Groves (I. G. Farbenindustrie.) March 31, 1937. (Samples furnished.) 492,905.

RENDERING TEXTILES WATER-REPELLENT.—Farberei, A.-G. Vorm. E. Stolte Nachf. and W. Missy. Oct. 15, 1936. 493,067.

MANUFACTURE OF IMPROVED FILAMENTS, threads, foils or sheets of cellulose esters or ethers.—J. G. Evans, A. Shepherdson, and Imperial Chemical Industries, Ltd. March 31, 1937. 493,111.

PROCESS OF MANUFACTURING PYRETHRUM EXTRACT.—Stafford, Allen and Sons, Ltd., and T. F. West. April 2, 1937. 493,074.

PRODUCTION OF RUBBER-LIKE PRODUCTS.—Beck, Koller and Co. (England), Ltd. Nov. 19, 1936. 492,906.

PRODUCTION OF COMPOSITIONS comprising rubber and artificial resins.—Beck, Koller and Co. (England), Ltd. April 3, 1936. (Samples furnished.) 492,811.

MANUFACTURE OF IRON OXIDE PIGMENTS.—A. P. Laurie. April 2, 1937. 493,118.

MANUFACTURE OF IMIDAZOLINES.—W. W. Groves (I. G. Farbenindustrie.) April 3, 1937. 492,812.

MANUFACTURE OF POLYMERIC PRODUCTS.—I. G. Farbenindustrie. April 3, 1936. 493,082.

PREPARATION OF CELLULOSE ESTERS having a high content of propionyl or butyryll.—Kodak, Ltd. April 3, 1936. 493,083.

MANUFACTURE OF ALKALI THIOCYANATES.—Rohm and Haas Co. April 9, 1936. 492,969.

DIESEL FUEL OILS.—G. W. Johnson (I. G. Farbenindustrie.) April 5, 1937. 493,084.

PREPARING THE HEXAMETHYLENETETRAMINE SALT of hexyl-resorcinol sulphonic acid.—H. Legerlotz. April 9, 1936. 492,914.

HALOGEN DERIVATIVES OF RUBBER.—R. P. R. Association, E. H. Farmer, and J. W. Barrett. April 12, 1937. 492,767.

MANUFACTURE OF CONDENSATION PRODUCTS.—A. Carpmael (I. G. Farbenindustrie.) May 11, 1937. (Samples furnished.) 492,776.

MANUFACTURE AND PRODUCTION OF VINYL CHLORIDE.—G. W. Johnson (I. G. Farbenindustrie.) May 20, 1937. 492,980.

TREATING CELLULOSIC MATERIALS such as paper, and fabrics to make them resistant to water.—Callender's Cable and Construction Co., Ltd., and T. L. Osborne. May 24, 1937. 492,832.

PROCESS FOR THE MANUFACTURE OF 4-HYDROXY-1-AMINONAPHTHALENE-8-CARBOXYLIC ACID and of 4-hydroxynaphtho-styril.—A. Carpmael (I. G. Farbenindustrie.) June 2, 1937. 492,987.

MANUFACTURE AND PRODUCTION OF VULCANISABLE MIXTURES of organic film-forming substances.—G. W. Johnson (I. G. Farbenindustrie.) June 21, 1937. 492,998.

MANUFACTURE OF PRODUCTS comprising dextrose.—International Patents Development Co. July 31, 1936. 493,005.

PRODUCING A PHOSPHORESCENT ZINC SULPHIDE COMPOSITION.—W. E. Evans (J. D. Riedel-E de Haën, A.-G.). Sept. 13, 1937. 492,923.

REMOVING ACID COMPONENTS FROM HYDROCARBONS or derivatives thereof.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. May 7, 1937. 492,789.

MANUFACTURE OF HYDROGEN PEROXIDE.—B. Laporte, Ltd. Oct. 6, 1936. 492,790.

OBTAINING OF ADSORBENT, absorbent and decolorising agents.—H. A. A. L. Hofmann (née Binder). Jan. 12, 1937. 492,929.

Chemical and Allied Stocks and Shares

BUSINESS in the stock and share markets has declined during the current week, largely owing to a disposition to await indications as to the Government's plans for accelerating rearmament and increasing the defence organisations. It is felt that developments in this connection may have important influences both on industrial and financial conditions, although it is recognised that in many directions rearmament work may tend to stimulate trade activity.

Shares of companies associated with the chemical and allied trades have made rather lower prices in sympathy with the surrounding tendency of the Stock Exchange, but various individual features of interest were shown. Fison Packard and Prentice ordinary were active around the higher price of 37s., on the raising of the dividend from 9 per cent. to 10 per cent., while Imperial Smelting ordinary shares were again fairly active, although they are 11s. 3d. at the time of writing and have not, therefore, held all their recent improvement, awaiting the annual meeting. British Aluminium were in better request earlier in the week on the assumption that further considerable expansion in the company's operations may be in prospect. On the other hand, Murex have been lowered to 72s. 6d. on the somewhat cautious statements at the annual meeting. International Nickel fluctuated sharply in common with most of the other leading dollar shares, although the assumption in the market is that the company's quarterly dividend is likely to be kept at 50 cents per share. The quotation for Greeff-Chemicals Holdings 5s. units has remained at 6s. 3d., following the interim dividend announcement. Boots Pure Drug were fairly steady, but are 40s. at the time of writing, compared with 41s. 3d. a week ago. Sangers and Timothy Whites and Taylors were little changed at 22s., and 24s. 6d. respectively, but Beechams Pills deferred shares have gone back to 8s. 7½d., awaiting the result of the company's offer for the ordinary shares of Eno Proprietaries. British Drug Houses were again quoted at 21s. 3d.

Associated Cement were lower at 80s. in sympathy with the general trend in leading industrial securities, while Turner and Newall moved down to 76s. 10½d. as a result of uncertainty whether the dividend will be kept on a 20 per cent. basis. Distillers have reacted to 92s. at the time of writing, largely owing to the fear that additional taxation may be in prospect for the distillery and allied trades. Wall Paper deferred at 35s. have been fairly steady, awaiting the preliminary results. B. Laporte continued at 85s., pending declaration of the interim payment. Tube Investments were lower at 82s. following the decision to maintain the distribution for the year at 23¾ per cent. The full results of the latter company do not fall to be issued before the end of next month. Stewarts and Lloyds deferred were around 36s., and Dorman Long, Staveley and most other iron and steel shares have not held all their recent improvement. Tecalemit were more active as a result of the higher dividend declared this week. Pinchin Johnson and other shares of paint manufacturers were inclined to make lower prices, including Lewis Berger. Results of the latter company are due during the next few weeks, as is the interim dividend of Cellon, Ltd. Triplex Glass shares fluctuated and are 28s. 6d. at the time of writing. United Glass Bottle are quoted at 47s. 6d., and the 1s. shares of Lancegaye Glass at 3s. 3d. British Celanese had a steadier appearance, awaiting the report and accounts which fall to be issued next month. In view of the decision in regard to the dividend on the first preference shares, the market is prepared for a set-back in the company's profits.

Oil shares have reacted owing to the lower oil prices now ruling in America, which have led to talk of a reduction in petrol prices before the turn of the year. Anglo-Iranian and "Shell" declined. Trinidad Leaseholds were affected by the unexpected "cut" in the dividend.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

MODERN FUELS, LTD., Seaham Harbour. (M.C., 22/10/38.) Oc. 5, £10,000 debentures (2nd series); general charge.

Satisfactions

BRITISH OIL AND TURPENTINE CORPORATION, LTD., London, W.C. (M.S., 22/10/38.) Satisfaction Oct. 11, of debenture registered March 19, 1925.

Companies Winding-up Voluntarily

BRITISH HYDROGENATION, LTD. (C.W.U.V., 22/10/38.) By special resolution, October 13, 1938, H. W. Hembry, 28 Grosvenor Place, London, S.W.1, appointed liquidator.

Chemical Markets

LONDON.—Trade in the general chemical markets continues to pursue a very steady course. The demand, if not brisk, is well spread over most sections of the market and a slight improvement is reported in the flow of inquiry for fresh contract business. Salammoniac has been moving rather well and Acetone and Lead Acetate are active at keen rates. There has been no further alteration on the convention quotations for Lead Oxides and values throughout remain unchaoged at recent levels. The market for Coal Tar products is almost without feature. The price position remains steady, but very little actual business is being put through. The immediate prospects are difficult to foresee, but the general feeling is that values are unlikely to decline further.

MANCHESTER.—Business in chemical products on the Manchester market during the past week has been a shade better, if anything, though buyers are mostly content to restrict operations to near delivery transactions pending the announcement of quotations for the leading lines for forward delivery. The tone of the market generally, however, is steady and there is little expectation of any important movement in favour of buyers. Contract deliveries to users in the important finishing and dyeing trades have shown a slight improvement and the flow of specifications from most other consuming branches are fair. In the by-products market locally a moderate business is going through in toluol and other light distillates at reasonably steady prices.

GLASGOW.—There has been some improvement in the demand for general chemicals for home trade during the week, but export business remains very quiet. Prices generally continue very steady at about previous figures; Copper, Lead and Spelter products being very firm on account of the higher prices for the metals.

The following price changes should be noted:—

RISES: Chromic oxide, 11½d.; copper sulphate (Manchester), £19 5s. 0d.; carbon black, 3⅜d. to 4 1/16d.; calcium cyanamide, November, £7 12s. 6d.; December, £7 13s. 9d.; January, 1939, £7 15s. 0d.; February, £7 16s. 3d.; March, £7 17s. 6d.; April/June, £7 18s. 9d.; wood cresote, 6d. to 8d.

FALLS:—Cadmium sulphide, 3s. 6d. to 3s. 9d.; cresylic acid. pale, 99/100 per cent. (Manchester), 1s. 11d.; calcium acetate, grey, £8 5s. 0d. to £8 10s. 0d.; methyl acetone, £32 to £35; citric acid, crystals (Scotland), 1s. 0¼d.

New Companies Registered

H. T. Watson, Ltd. 344,754.—Private company. Capital, £100 in 1,000 ordinary shares of 2s. each. To acquire the business of a chemical engineer now carried on by Harold T. Watson at 7a Commercial Buildings, Victoria Road, Widnes, Lancs., as "H. T. Watson." Directors: Harold T. Watson, 46 Fairfield Road, Widnes, Lancs.; Norman M. Watson; Harold S. Watson.

Forthcoming Events

London.

October 26.—Iron and Steel Institute. Annual Meeting. Institution of Civil Engineers, Great George Street, S.W.1. 10 a.m. and 2.30 p.m.

Iron and Steel Institute (London Section) and Institute of Metals. Royal School of Mines, South Kensington. 8 p.m. Professor G. I. Finch, "Electron Diffraction and Surface Wear."

October 27.—Institute of Metals. Autumn Meeting. Institution of Mechanical Engineers, Storey's Gate, S.W.1. 10 a.m. and 2.30 p.m.

October 28-30.—Institute of Vitreous Enamellers. 5th Annual Conference. Hotel Normandie, Knightsbridge.

October 29-November 4.—International Brewers' Exhibition.

October 31.—Chemical Club, 2 Whitehall Court, S.W.1. 7.30 p.m. Annual General Meeting.

November 1.—Institution of Chemical Engineers, Burlington House, Piccadilly, W.1. 6 p.m. H. Guinot and F. W. Clark, "Azeotropic Distillation in Industry."

November 1-2.—Institution of Gas Engineers. Autumn Research Meeting.

November 2.—Society of Public Analysts and other Analytical Chemists, Burlington House, Piccadilly, W.1. 8 p.m.

Aberdeen.

October 28.—Institute of Chemistry, Marischal College. 5.15 p.m. Dr. J. A. Lovern, "Some Recent Aspects of Vitamin A Research."

Cardiff.

October 26.—Cardiff Technical College Chemical Society and Local Fellows of the Chemical Society. Technical College. 6 p.m. Professor J. Kenyon, "Optical Activity as a Guide to Reaction Mechanism."

Edinburgh.

November 2.—Chemical Society. Joint Meeting with Edinburgh University Chemical Society. Medical Chemistry Theatre, Teviot Place. 7.30 p.m. Professor R. G. W. Norrish, "Plastics and Polymerisation."

Hull.

November 1.—Hull Chemical and Engineering Society. East Hull Gas Co.'s Showrooms, Holderness Road. 7.45 p.m. B. Stonham and R. Metcalfe, "Recent Developments in the Manufacture and Utilisation of Town Gas."

Leeds.

October 24.—Society of Chemical Industry, The University, Woodhouse Lane. 7.15 p.m. A. H. Dodd, "Chemical Preparations for the Motorist"; C. S. Whewell, "Moths and Moth Proofing."

Manchester.

November 2.—Institute of Metals, Blackfriars House, Blackfriars Street. 7.15 p.m. D. M. Smith, "Quantitative Spectrographic Analysis."

Newcastle.

October 28.—The Bedson Club, King's College. 6.45 p.m. Max Born, "Statistics in Chemistry and Physics."

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

South Africa.—H.M. Senior Trade Commissioner in South Africa reports that the Cape Town Electricity Supply Commission is calling for tenders for the supply and delivery of two self-contained air-conditioning units designed for use on a 220-volt 50-cycle single-phase system of supply. Tenders will be received in South Africa up to November 9, 1938. (Ref. T. 27672/38.)

Canada.—A firm of agents established at Toronto wish to obtain the representation, on a commission or consignment basis, of United Kingdom manufacturers of special lines of interest to druggists for the Province of Ontario. (Ref. No. 266.)

Company News

Fison Packard and Prentice are paying a final dividend of 7½ per cent., making 10 per cent. for the year.

Cerebos, Ltd., announce an interim dividend of 10 per cent., less tax, being the same as distributed last year.

Vidux Chemical Manufacturers, Ltd., 83 Great Portland Street, W.1, changed its name to Vidux Limited, on October 10.

Van Den Bergh's En Jurgens' Fabrieken announce an interim dividend of 15 per cent. preferred "A" shares in respect of 1938.